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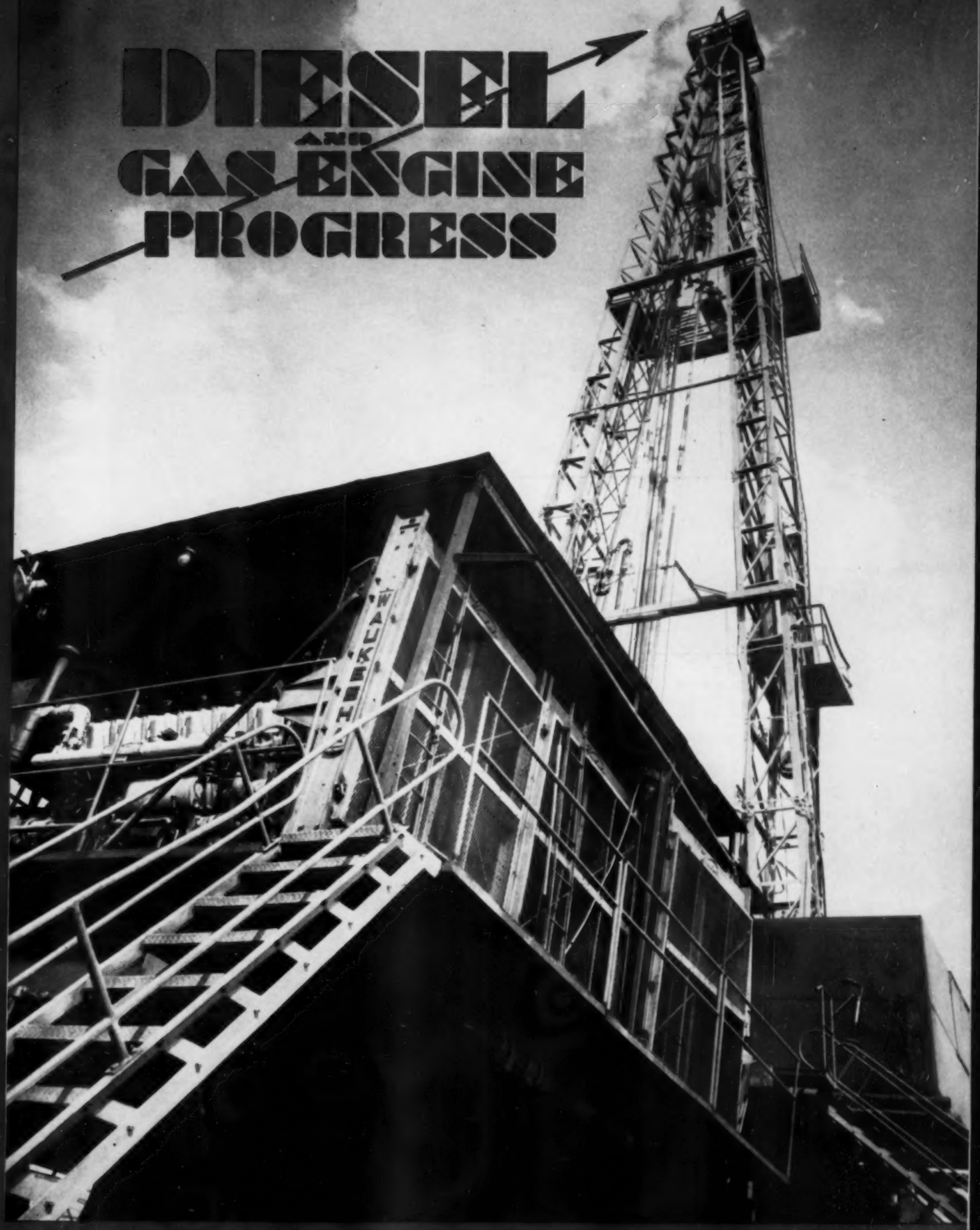

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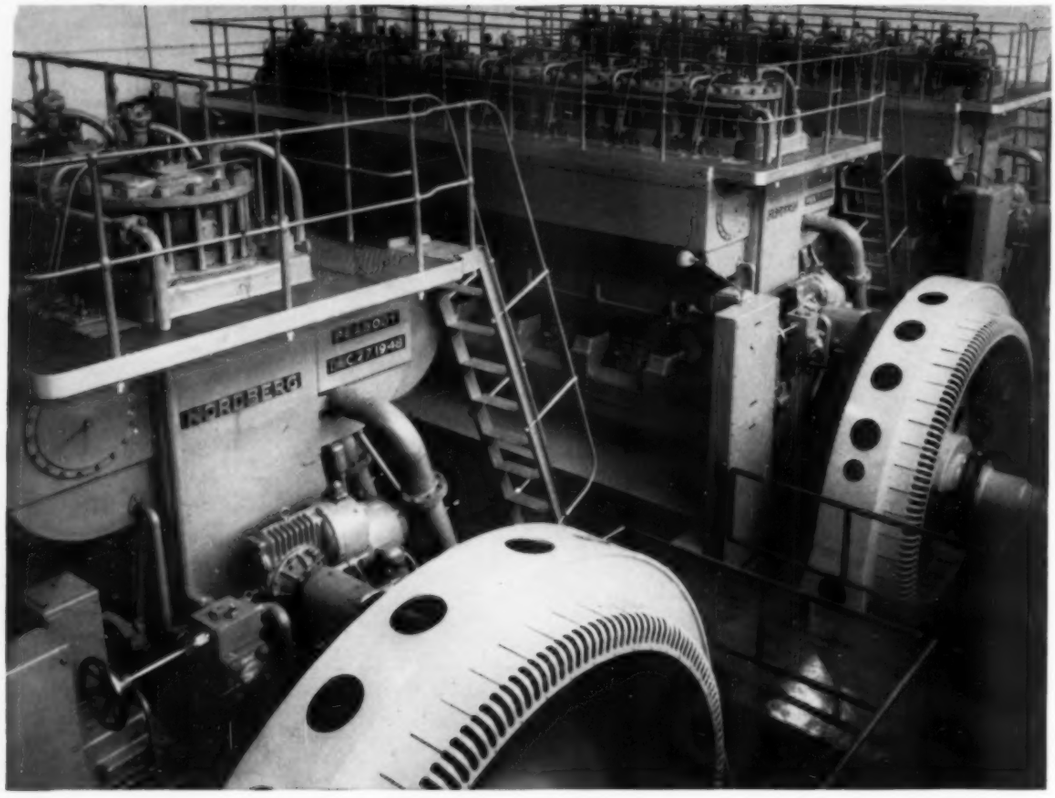

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DIESEL AND GAS ENGINE PROGRESS for September, 1959, Vol. XXV, No. 9. Published Monthly by Diesel Engines, Inc., 1701 W. Wisconsin Ave., Milwaukee 3, Wisc. Phone DIvision 4-5355. Subscription rates are $5.00 for U.S.A. and possessions. All other countries $7.50 per year. Subscriptions may be paid the London Office at £2-12s-6d per year. Accepted as Controlled Circulation Publication at Long Prairie, Minnesota.

DIESEL AND GAS ENGINE PROGRESS is indexed regularly by Engineering Index, Inc. and is available in microfilm editions from University Microfilms, Inc., Ann Arbor, Michigan.

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CONTENTS FOR SEPTEMBER, 1959

Thermo King Orders 1500 Diesels For Reefers 19
3200 HP *Northern* Joins Fleet 22
Ponca City Has Largest Dual Fuel 24
Lightweight Air Compressor For Automotive, Industrial Diesels 27
Diesel Taxis Pass Los Angeles Test 28
Waterflood Project Aim: Oil Bonanza 31
Dynamometer Provides "Ounce of Prevention" 34
Compact Hydraulic Governor For High Speed Diesels 36
Siren Fog Signal Powered By Diesels 38
Heavy Fuel Boosts Profits At New Smyrna Beach 39
Clark's Two-Cycle V-Type Gas Engine 42
What's Going On In England 44
New High Speed Power Take-Off 45
Small I-H Tractor is Turbocharged 45
Diesel Service Progress 46

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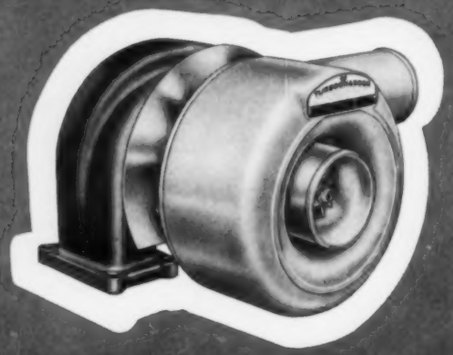
FRONT COVER ILLUSTRATION

Three V-type, 12-cylinder Waukesha VLRD diesels, each rated 900 hp (max.) at 1200 rpm, power mud pumps and rotary table on an Ideco derrick owned by Dillard-Waltermire, Inc., on location for Sinclair Oil & Gas Co., South of Alamo, Tex.

SCHWITZER
Turbochargers



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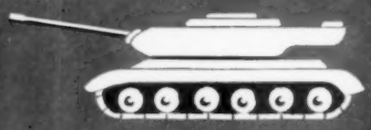

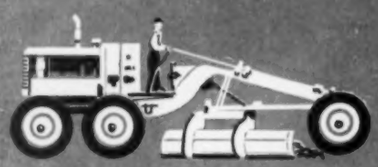

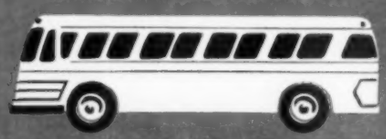

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Schwitzer Products manufactured in Europe and South America

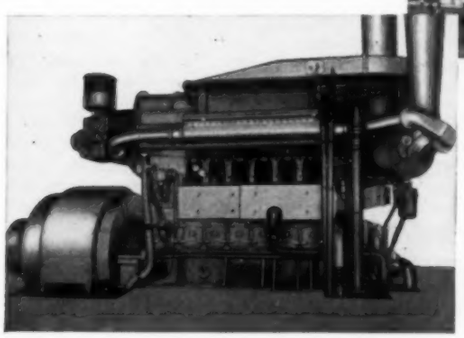
Compact and Heavy Duty for Southern Bell

When selecting stand-by power for the long lines center of half a continent you must look beyond the normal considerations of choice.

In the enlargement of its toll facilities, including radio and TV network long line services, Southern Bell Telephone & Telegraph Company has again chosen a Fairbanks-Morse diesel generator set for vital protection of commercial and national security needs. The F-M Diesel is a 6 cylinder, turbo-supercharged, opposed piston engine. Due to the turbo-supercharging it gives the required output in a very minimum of building space. Nor is the high output obtained at the sacrifice of reliability common to small, high speed engines.

If your power plans call for compactness *with* reliability, an investigation of the turbo-supercharged Fairbanks-Morse Opposed Piston engine is indicated.

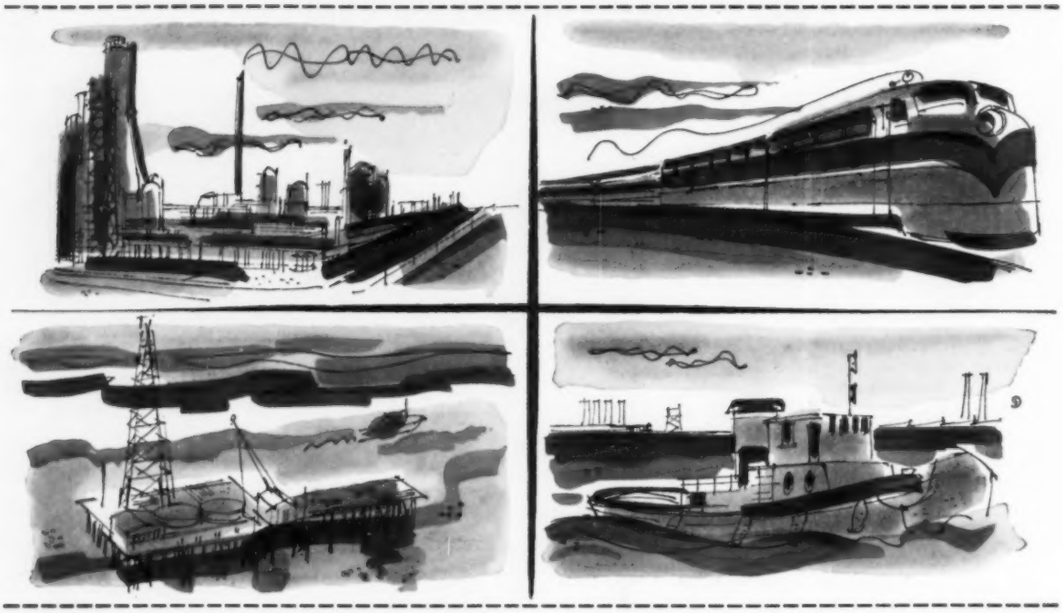
The Southern Bell Tel. and Tel., toll office building in Atlanta, Georgia, as it will appear after present and proposed additions are completed.



This 6 cylinder turbo-supercharged F-M Engine is ideal for installation in buildings where floor space is expensive. The turbo-supercharging may add up to 50% to horsepower output.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST



it's KOPPERS Piston Rings

Where profit depends on keeping equipment in service, engineers recognize the importance of ring performance. That is why Koppers Piston Rings go into the finest engines in the world . . . why they are selected for replacement when better performance is demanded.

Since the first diesel engine, Koppers has produced piston rings of predictable performance in a complete range of materials and a wide selection of types and sizes. If you have a ring problem, Koppers can offer you the benefit of their experience. Write to: KOPPERS COMPANY, INC., Piston and Sealing Ring Department, 4209 Hamburg Street, Baltimore 3, Maryland.

Send now for Koppers recommended Piston Ring Set-Ups applicable to the engines which you operate.

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Behind Our Air Power And The SAGE System

7 Enterprise DSQ-38 Turbocharged Diesels provide completely independent power at "joint center" SAGE system power plant, McChord AFB, Wash.

...Electric Power by ENTERPRISE

This is one of the vital SAGE* system plants powered by Enterprise. In all, 25 Enterprise Engines provide some 44,000 HP, or 31,000 KW of power required to operate four of the complex SAGE network centers.

SAGE is the giant cyclops eye that will survey the skies far beyond our borders in a continuous search for aerial invaders. It's automatic. Electronic equipment can assemble and correlate information on air activity from a vast number of sources, describe the air situation, and direct interceptor aircraft and pilotless missiles to the target—all in a matter of seconds.

The need for totally dependable, uninterruptable electric power to operate computing and other equipment is obvious. Without it, SAGE just couldn't function. Our air defense system would be useless. That's why Enterprise Engines, both straight diesel and dual fuel types, have been installed in many of these critical centers. They meet rigid Air Force requirements—rewarding testimony to their real value.

No power plant should settle for less than Enterprise quality, long the choice of power experts. Get full information on models from 73 to 7703 HP in diesel, dual fuel, tri-fuel and spark ignited gas engines.

*Semi-Automatic Ground Environment

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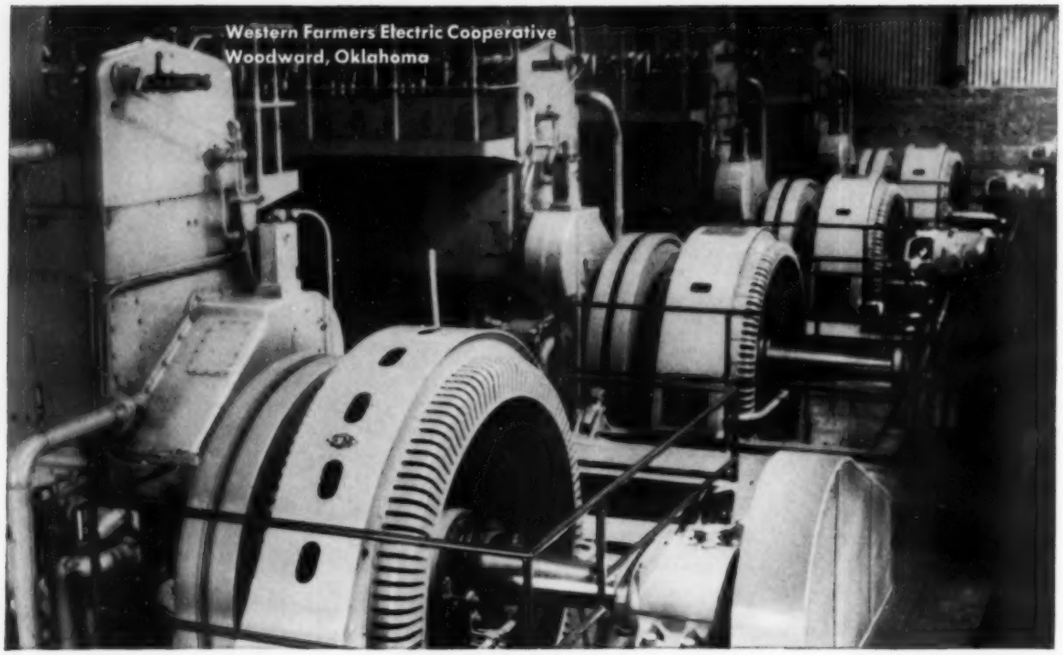


8 years with same pistons; cylinder wear .005 using Cities Service DC-940 Oil

Nordberg engines roll up over 44,000 hours with minimum wear, no lubrication problems.

Frequently running at 77% of plant capacity, Western Farmers Electric Cooperative is getting newsworthy service from its eight year old Nordberg engines and Cities Service DC-940 Oil.

Three of its four engines have piled up over 44,000 hours each . . . and two of these three still have the original piston rings! Average cylinder wear is .005, and horsepower hours per gallon of lube oil are running as high as 14,000!

Says Plant Superintendent H. P. Wingo: "In the entire eight years we've been using Cities Service DC-940, downtime for maintenance has been almost nonexistent and we've never had a lubrication problem of any kind. Thanks to this kind of performance, we continue to hold one of the highest REA power efficiency ratings."

If you're looking for a lube oil capable of increasing horsepower hours per gallon—an oil properly fortified to prevent oxidation and engine wear—get the facts about Cities Service DC Series Oils. Talk with a Cities Service diesel lubrication specialist from the nearest office. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

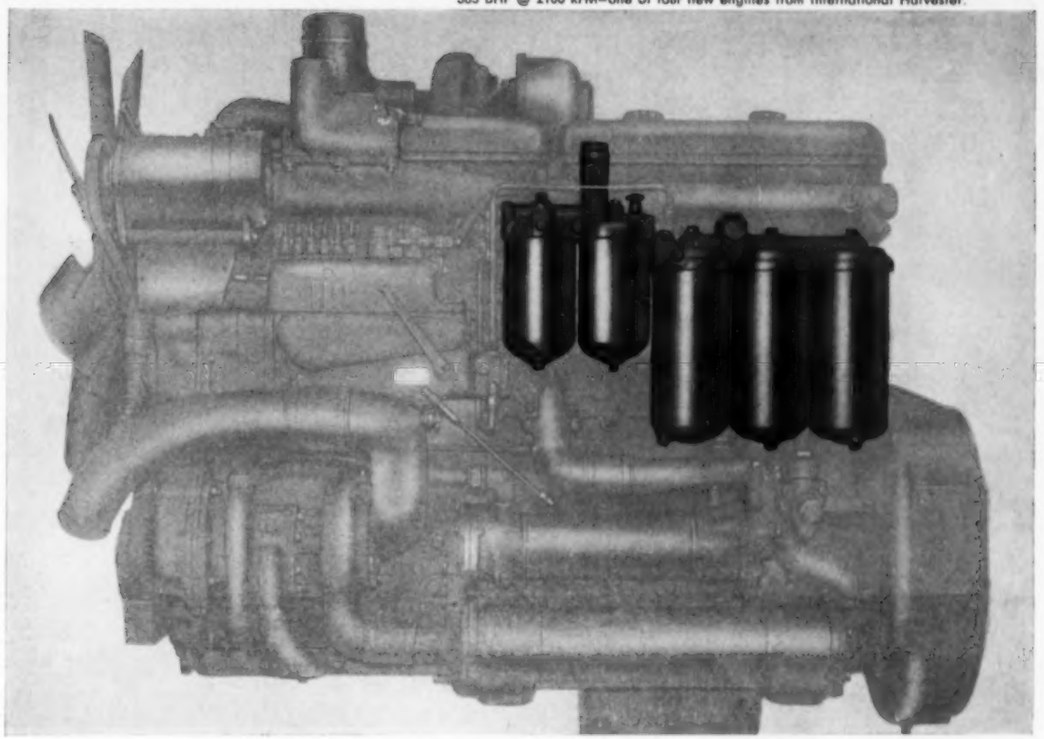
CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

Supt. H. P. Wingo and Assistant Supt. Harold Conley keep Western Farmers Electric Cooperative high among REA power efficiency ratings. Both credit Cities Service with a major assist.

For The Record . . . And What A Record! Often at 77% capacity, Western has operated its Nordbergs for eight years with absolutely no lubrication problems using Cities Service DC-940. 14,000 h.p. hrs. per gallon is common.

This is the UDT-817, a turbocharged, heavy-duty, direct-start diesel engine with 385 BHP @ 2100 RPM—one of four new engines from International Harvester.



WHY PUROLATOR FILTERS ARE STANDARD EQUIPMENT ON INTERNATIONAL HARVESTER'S NEW LINE OF DIESELS

Purolator is the chief supplier of filters for the lubricating system and fuel system of four new diesel engines from International Harvester. International Harvester tells why:

"Effective filtering of lubricating oil and fuel oil is of utmost importance for long engine life and efficient and economical engine operation. The small additional cost of quality filters is insignificant compared to costly maintenance and downtime expenses which could result from poor filtering. Quality filters are low-cost insurance for an investment of thousands of dollars, as represented by these precision built, high quality engines."

Purolator makes a complete line of filters for fuel and lubricant systems in all types of engines. There is a Purolator filter that is sure to meet your most exacting specifications. Let us know your needs and problems. Our filtration engineers will gladly supply their filtration knowledge and experience—and high quality Purolator filters.

Filtration For Every Known Fluid

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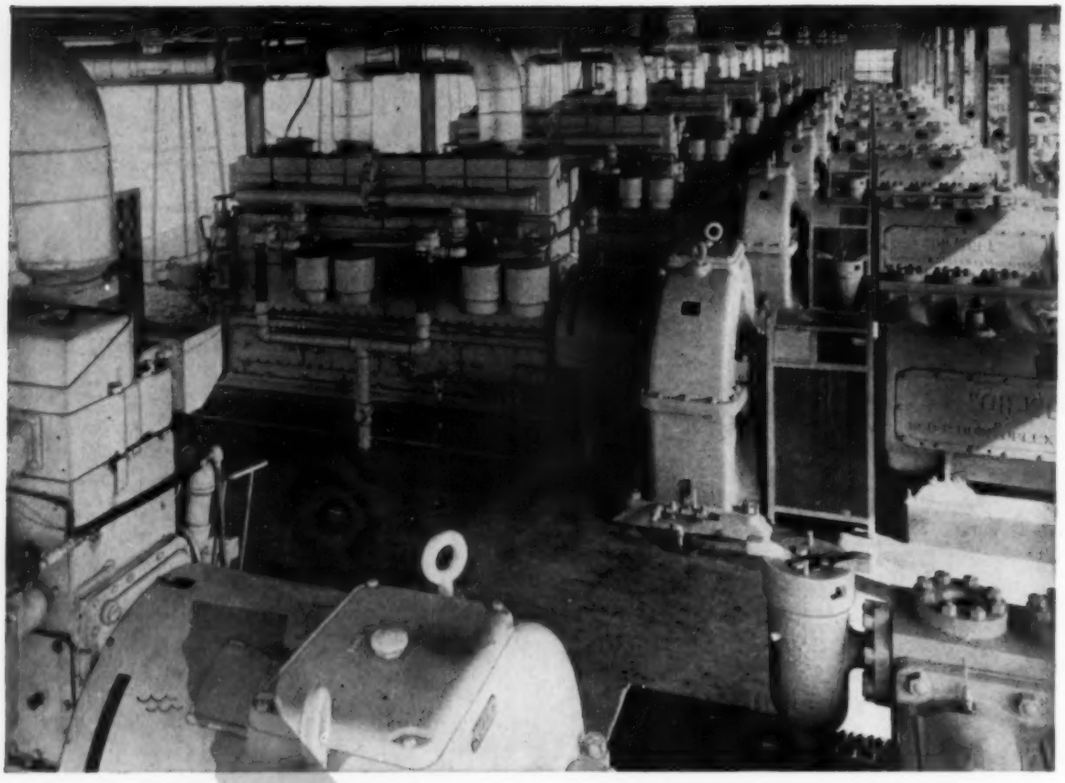

Superior engines power the pumps for world's largest waterflood!

At City of Long Beach's busy waterflooding plant on City Pier "A," 8 White Superior gas engines drive pumps that suck 120,000 barrels per day from the Pacific and inject it into Wilmington tract beneath the city. This waterflooding project, which may eventually reach 1,000,000 bpd to become the world's largest, provides additional pressure for secondary oil recovery, and may possibly arrest or ameliorate land subsidence in the port area.

Dependable Superior engines are a wise choice for this open air, round-the-clock, long range pumping duty. Each Superior Model 8G-825 at Long Beach is rated 500 HP at 862 RPM to drive pumps through speed reducers. This true, conservative horsepower rating eliminates "straining" which shortens engine life. It also allows plenty of reserve power to meet extreme operating conditions. Superior's rugged open chamber combustion, precision construction and many new improvements combine to conserve fuel.

For every oil field job—waterflooding, drilling, production and pipe line pumping, repressuring, compressing or electric generation—specify Superior. Available in diesel, dual-fuel or gas engines from 190 to 2150 HP and in portable or stationary generator sets from 150 to 1500 KW. Get complete information from leading oil field distributors, White oil field representatives, or through . . .

Superior ENGINES ATLAS Imperial DIESEL ENGINES White DIESEL

White Diesel

WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY
Plant and General Offices: Springfield, Ohio

BOOTH "L"

MAY 14-20, 1939
Tulsa, Oklahoma

ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL

FIRM EDWARD KEEBLE CONSTRUCTION CO.
San Jose, California

RPM DELO Oil keeps tractor on the job 15 years

Still Working after 15 years using RPM DELO Oil in this D-8 Caterpillar operated by Edward Keeble Construction Co. Block, crankshaft, and most other parts of original engine are still in use. Another of firm's D-8's using RPM DELO Oil ran 12,000 hours without engine repairs. When torn down, maximum crankshaft wear was .004".

Crawler Crane, like firm's other heavy-duty equipment, uses RPM DELO Oil. Keeble operates 120 pieces of construction equipment—has as many as 30 jobs going at once.

GMC V-8 10-Yard Dump Truck (left), one of a new fleet of 12, also uses RPM DELO Oil. Mr. Keeble (right), says, "For the past 15 years we have kept our heavy-duty engines in top operating condition with RPM DELO Oil. In several instances engines have actually outlasted equipment."

Why RPM DELO Oils reduce wear—prolong engine life

- Oil stays on engine parts – hot or cold, running or idle
- Anti-oxidant resists lacquer formation
- Detergent keeps parts clean
- Special compounds prevent corrosion of bearing metals
- Inhibitor resists crankcase foaming

For More Information or field help with any fuel or lubrication problem, contact representative of any company listed, or write direct.

LUBRICATING OILS RPM DELO

TRADEMARK "RPM DELO" AND DESIGN REG. U. S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20
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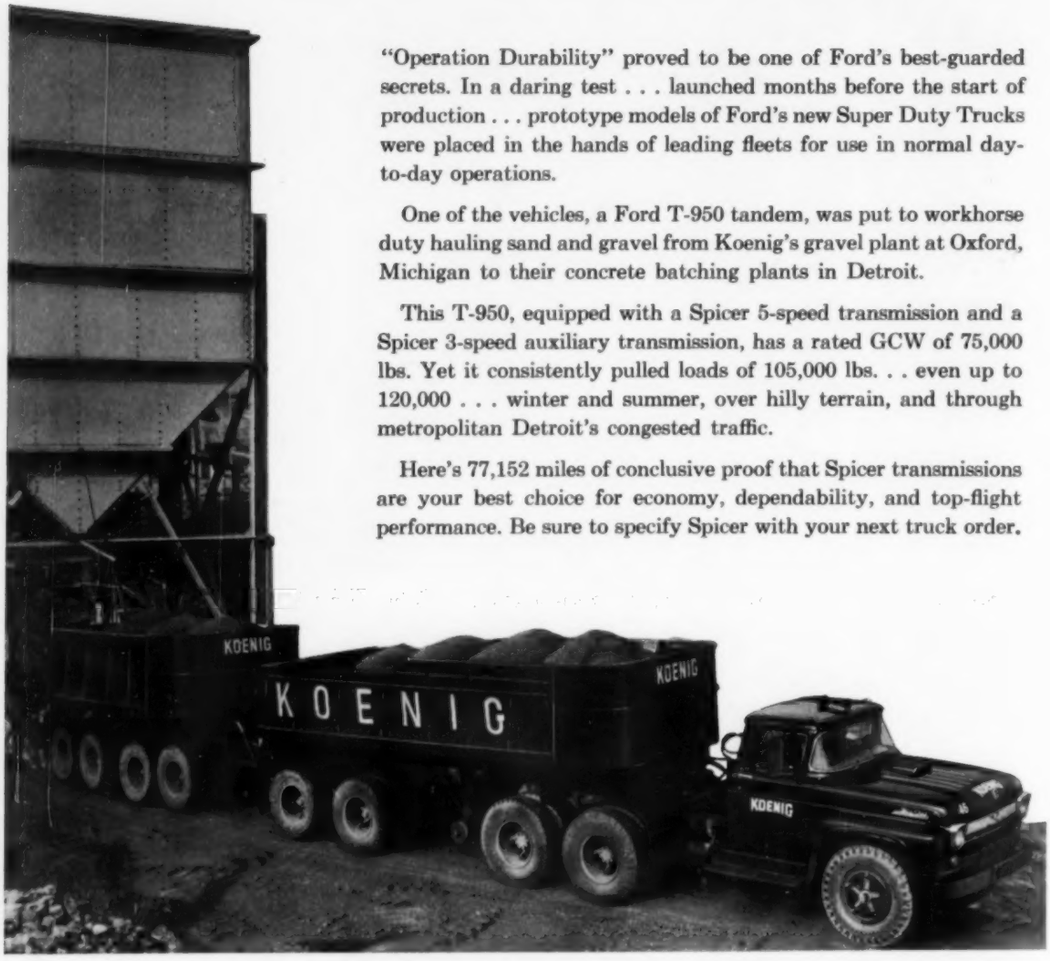
Koenig rolls up 77,152 trouble-free miles with a Spicer 5-speed transmission during FORD'S

"OPERATION DURABILITY"



"Operation Durability" proved to be one of Ford's best-guarded secrets. In a daring test . . . launched months before the start of production . . . prototype models of Ford's new Super Duty Trucks were placed in the hands of leading fleets for use in normal day-to-day operations.

One of the vehicles, a Ford T-950 tandem, was put to workhorse duty hauling sand and gravel from Koenig's gravel plant at Oxford, Michigan to their concrete batching plants in Detroit.

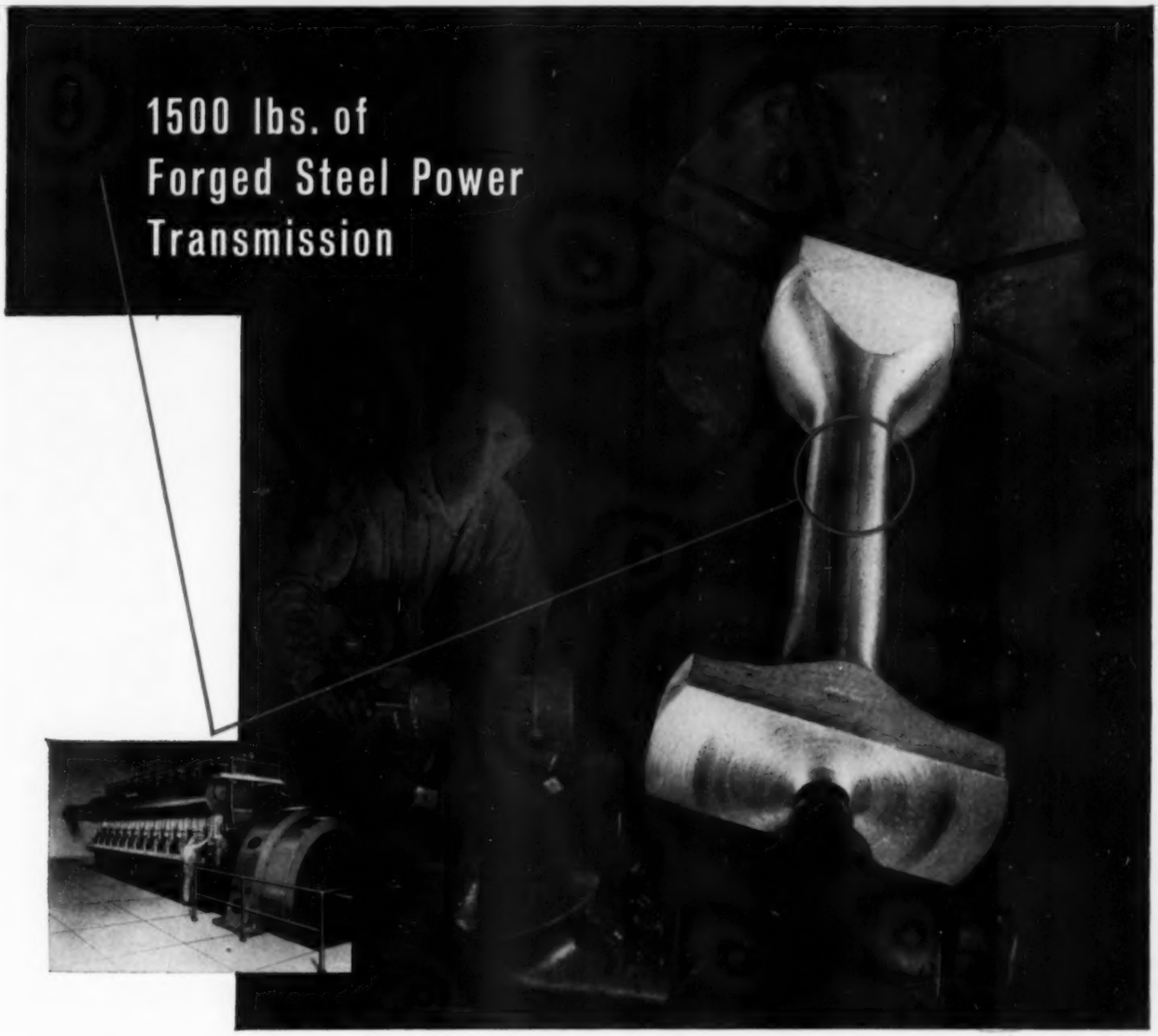
This T-950, equipped with a Spicer 5-speed transmission and a Spicer 3-speed auxiliary transmission, has a rated GCW of 75,000 lbs. Yet it consistently pulled loads of 105,000 lbs. . . even up to 120,000 . . . winter and summer, over hilly terrain, and through metropolitan Detroit's congested traffic.

Here's 77,152 miles of conclusive proof that Spicer transmissions are your best choice for economy, dependability, and top-flight performance. Be sure to specify Spicer with your next truck order.

DANA Spicer **DANA CORPORATION**
Toledo 1, Ohio

SERVING TRANSPORTATION—Transmissions Auxiliaries • Universal Joints • Clutches • Propeller Shafts • Power Take-Offs • Torque Converters Powr-Lok Differentials • Gear Boxes • Forgings Axles • Stampings • Frames • Railway Drives

Many of these products are manufactured in Canada by Hayes Steel Products Limited, Merritton, Ontario



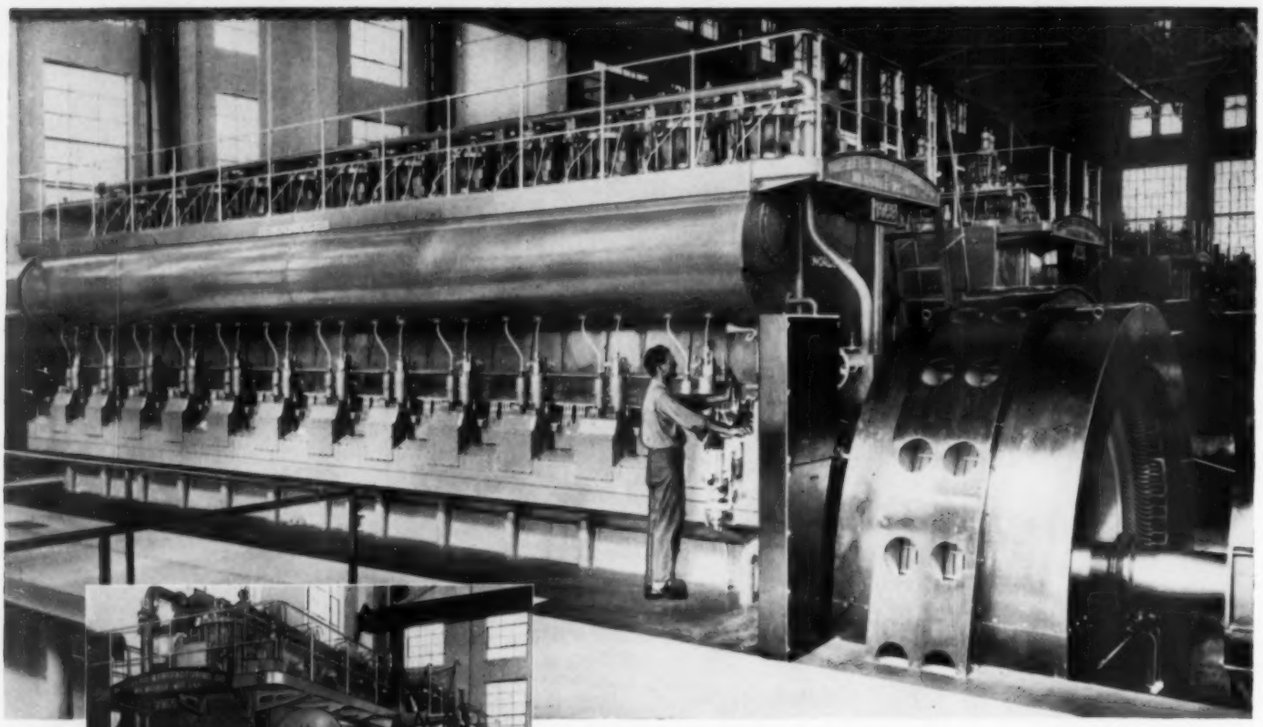
This 1500 lb. forged steel diesel engine connecting rod is taking a "dressing down". At working weight (1400 lbs.) it will transmit horse power in a municipal power plant. Another photographic example of the diverse sizes and weights of component parts going through our forge shops daily. You are assured of the same engineering and metallurgical quality control, the same careful craftsmanship which characterize steel forgings weighing 80 tons and more, when you place with us the responsibility for making any size forged steel component part.

Regardless of the size or weight of steel forgings or castings you require, it will pay you to consult with us.

ERIE FORGE & STEEL CORPORATION

ERIE, PENNSYLVANIA

Why taxpayers vote YES ☒ for money-saving diesel power



P659

In Ponca City, Oklahoma . . .

9 NORDBERG ENGINES help make a net profit of almost $1,000,000 a year

POWER PLANT PROGRESS

1924—First 1250 hp Nordberg Diesel installed at Ponca City.

1926—Second 1250 hp Nordberg Diesel installed at Ponca City.

1928—Two more 1250 hp Nordberg Diesels installed.

1937—2250 hp Nordberg Diesel started (converted to dual fuel in 1947).

1947—2400 hp Nordberg Duafuel engine installed.

1949—3600 hp Nordberg Duafuel unit added, one 1250 hp unit retired.

1952—4275 hp Nordberg Duafuel engine went into service.

1953—5135 hp Nordberg Duafuel installed.

1955—Ponca City's latest addition—10-cylinder, 29" bore x 40" stroke Nordberg Duafuel engine, rated 8500 horsepower.

The world's largest dual fuel engine is helping the Ponca City, Oklahoma municipal power plant attain new records in production volume, operating economy, and net profits. This 8,500 horsepower Nordberg Duafuel® unit (shown at left), together with eight other Nordberg engines in this notable plant, produced a total of over 55 million kilowatt-hours in the fiscal year ended June 30, 1958, at a total production cost of just 5.67 mills per kwh. *Net profit for the year was over $920,000.00, and net plant profit for 10 years exceeded $7,000,000.00.*

Ponca City and its Light Department owe much to experienced Superintendent of Utilities Pat Schlesinger, who not only directs operations but engineered the big installation. This highly successful municipal plant is a joint achievement, with credit due to Mr. Schlesinger's able staff and to the many present and past city officials who cooperated in the development of this efficient and profitable municipal utility . . . an outstanding example for other municipalities to follow.

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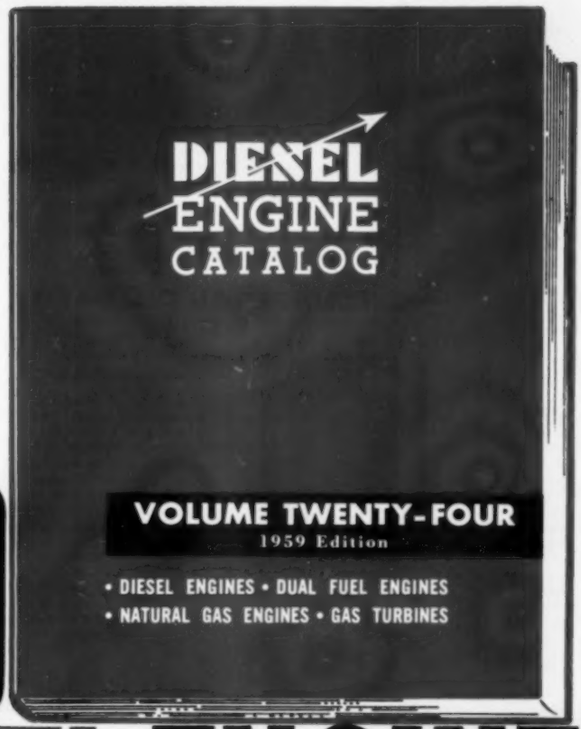

1959 DIESEL ENGINE CATALOG

LOOK AT THE CONTENTS!

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L. A. Ffrench Joins Cooper-Bessemer International

Appointment of Mr. Leopold A. Ffrench to the Cooper-Bessemer International Corp. office at New York was announced recently by Mr. Charles G. Cooper, president of Cooper-Bessemer International. Ffrench will devote his attention to the application and sale of engine-driven and motor-driven compressors for overseas installation. Ffrench holds a Chemical Engineering degree from Rice Institute. He was formerly associated with Clark Bros. Co. as a sales engineer.

Mr. C. R. (Bob) Jones has been named general manager of Cooper-Bessemer of Canada, Ltd. Presently vice president and Western district manager, Jones also was elected to the board of directors. In his new capacity, Jones is responsible for Cooper-Bessemer of Canada manufacturing and sales activities.

The appointment of Mr. Harry A. Cecsarini to the post of European manager of Cooper-Bessemer, S. A., has been announced by President Charles G. Cooper. Cooper-Bessemer Societe Anonyme, is a Swiss company incorporated in Chur, Switzerland, with offices at The Hague, Netherlands. The company was established in 1958 for the purpose of furthering world-wide application and sale of Cooper-Bessemer engines and compressors outside of the United States and Canada. A graduate of Ohio State University, Cecsarini joined Cooper-Bessemer in 1949. Cecsarini will be located at The Hague.

Low pressure loss air filtration

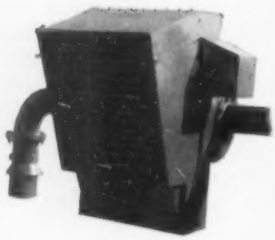
for intakes of turbocharged engines

What's Your Need? No one filter can meet all requirements. Low pressure loss, however, is a prerequisite. Air-Maze has a wide line of similar low pressure loss filters built for turbocharged engines.

For your requirements, call in your Air-Maze representative, or write for any of the bulletins listed.

TRAVELING CURTAIN

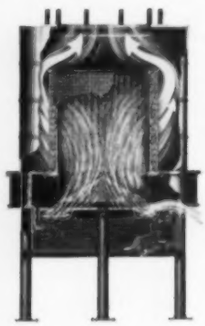
Automaze®



A viscous impingement panel-type filter that cleans itself... automatically. Goes 3 to 6 months or more without attention. Maintains initial filtering efficiency and low pressure drop because the filter panels are continuously cleaned and recharged with adhesive. Single units in sizes to 30,000 cfm. Details in Bulletin AMC-256.

CYLINDRICAL OIL BATH

Type LPD
(Low Pressure Drop)



This type of filter has no moving parts, yet provides high dirt-removing efficiency with pressure loss as low as 1-inch water gauge. Available in capacities up to 24,000 cfm, depending upon tolerated pressure loss.

Service is limited to occasional checking of oil level and periodic draining and cleaning of sludge. Write for Bulletin LPD-1055.

FOR REPLACEMENT OF VISCOUS PANELS

Panel Bath

Lends itself to simple, inexpensive installation in existing vertical panel adapters on railroad engine air intakes. Utilizes an air stream to engage oil in a reservoir carrying the oil to the filter media. Impinged, dirt-laden oil drains to sump carrying the dirt with it. The action provides a continuous, efficient self-cleaning action. Operating range—400 to 1,750 cfm. Ask for Bulletin RPB-1058.

FOR OIL-FREE FILTRATION

"DA" Dry-Type

Gives better than 98% efficiency on 2-micron mean diameter particles and 100% filtration on 5-microns or larger. Suitable for installations where—oil-free air is required; extremely high degree of filtration is required; where air velocity varies from one period to another; where dirt concentration is relatively low. Can be sized to meet any pressure drop requirement. Ask for Bulletin DA-1056.

The biggest names in diesels are protected by Air-Maze filters

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The Filter Engineers
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Subsidiary of ROCKWELL—STANDARD Corporation

AIR FILTERS • SPARK ARRESTERS • LIQUID FILTERS • SILENCERS • OIL SEPARATORS • GREASE FILTERS

Association of Diesel Specialists September Meeting

The Association of Diesel Specialists, through its Program Chairman, Mr. John H. Walton, has announced the program for its Chicago meeting, Sept. 17-20, at the Hotel Sherman. The program follows:

Thursday, Sept. 17: 10 a.m., registration; 1 p.m., board meeting.

Friday, Sept. 18: 7 a.m., registration; 7:30 a.m., leave for tour of Allis-Chalmers Mfg. Co. Works, Harvey, Ill.; 3 p.m., manufacturers time, Mr. William Boedecker, chairman; 3 p.m., exhibits; 6 p.m., cocktail party.

Saturday, Sept. 19: 8:30 a.m., registration; 8:30 a.m., welcome by president; 9 a.m., paper by Witte Engine Works, "Dependable Diesel Power for Mechanical Refrigerator Cars"; 10:15 a.m., talk on fuel injection by Mack Trucks, Inc.; 1:15 p.m., talk on excise tax product liability, Mr. Harold Halfpenny, Halfpenny, Hahn and Cassidy, Chicago; 2:15 p.m., "Chemical Cleaning of Governor Parts," Woodward Governor Co.; 3:30 p.m., panel discussion; 6 p.m., cocktail party.

Sunday, Sept. 20: 9 a.m., committee meetings; 10:30 a.m., discussion by members of A.D.S.; 1:30, adjournment.

Metal Finishers Appoints Sales Representative

Mecrome Division of Metal Finishers, Inc., has appointed North American Supply Co. as its sales and service representative in the Chicago area for the restoration of cylinder liners and other devices for diesel engines. Headquarters for the new representative is 1860 Illuminating Bldg., Cleveland, Ohio. Representatives for the Chicago area will be stationed there.

Southwest Diesel Notes

By Donald M. Taylor

AWAKE, a shrimp boat owned by W. E. Tillman, Pass Christian, Miss., recently was repowered by a 72 hp Cummins J-6-M diesel. This sale was made by Cummins Sales & Service, Inc., Biloxi, Miss.

JIM Thornton, Biloxi, Miss., owner of the shrimp boat, *Lucky Lindy*, repowered his craft with a 175 hp HR-6-M Cummins diesel. Cummins Sales & Service, Inc., Biloxi, made the sale.

WALSH Stevedoring Co., Gulfport, Miss., has repowered a 3000 Manitowoc crane with a 175 hp HR-6-BI Cummins diesel supplied by Cummins Sales & Service, Inc., Biloxi.

BURTON Construction and Shipbuilding Co., Port Arthur, Texas, took delivery on three-cylinder General Motors 3031C closed-type diesel units. Stewart & Stevenson Services, Inc., of Houston was the supplier.

STATES Electric Co., Ft. Worth, purchased a Stewart & Stevenson 6 GD(T) turbocharged 160 kw generator set. Power comes from GM series 71, six cylinder turbocharged 6-71 engine.

WELLS-TAYLOR Wood Preserving Co., Gautier, Miss., has a new 160 hp JS-6-B Cummins engine in a WC-22 PLT White tractor, and a 175 JNS-6-B Cummins in a B-42 Mack tractor. These sales were made by Cummins Sales & Service, Inc., Biloxi, Miss.

SOUTHERN Shell Fish Co., Biloxi, Miss., recently rebuilt the *Creole*, replacing a gasoline engine with a 127 hp rebuilt HR-6-M Cummins diesel supplied by Cummins Sales & Service, Inc., Biloxi.

THE A. W. Williams Drilling Co., Mobile, Ala., has installed a 220 hp rebuilt NH-220-BI Cummins engine in a Franks 6000 drilling rig. Cummins Sales & Service, Inc., Biloxi, made this sale.

NATIONAL Car Rentals, San Antonio, Texas, has installed a 220 hp NH-220 Cummins diesel in an International Harvester DCO-405. Cummins Sales & Service, Inc., Ft. Worth, made the sale.

STEPHENS Diesel Service, Morgan City, La., purchased a Stewart & Stevenson 2 GD-20-20 kw marine-type generator set powered by GM series 71 two-cylinder model 2061A engine.

CUMMINS NH-220 to Gerald Bruggeman, Hoskins, Neb., to repower an IHC LCD-405, from Cummins Mid-West, Inc., Omaha, Neb.

ILLINOIS Tractor Co., with headquarters in Mt. Vernon, Ill., has established a construction machinery branch at Sikeston, Mo. It is an Allis-Chalmers dealer.

Engine Distributor Appointed

American Marc Inc., California manufacturer of diesel engines, natural gas engines, generators and generator sets, has appointed Gee-Mee Supply Co., Maracaibo, Venezuela, as exclusive distributors for the eastern districts of the state of Zulia, Venezuela, including Maracaibo. The new appointment serves to continue the company's policy of ever broadening distribution lines in the foreign export field. American Marc now maintains distributors in all major marketing areas of the United States, Canada and Latin America and has representation in the Near East, Far East, Europe and the United Kingdom.

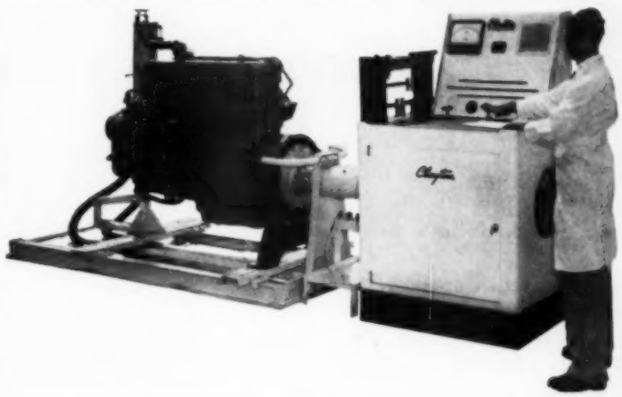
THERE'S A *Clayton* DYNAMOMETER FOR EVERY NEED OF INCREASED HORSEPOWER!

COMPLETE *LINE* OF CHASSIS DYNAMOMETERS

Don't throw away the power built into your truck engine. When your truck operates at peak horsepower you get better fuel mileage and peak economy. Only with a Chassis Dynamometer can you be assured of power-proved performance.

Clayton Chassis Dynamometers are designed to test a truck under actual driving conditions . . . . simple to operate . . . . easy to install.

There is a Clayton Chassis Dynamometer model to fill every service requirement.



COMPLETE *LINE* OF ENGINE DYNAMOMETERS

Clayton Engine Dynamometers are designed for testing and "Running-In" all types of gasoline or diesel engines. Quickly and accurately determines road or job performance before installation. Torque loads can be changed at will or maintained indefinitely. A model for most any application. There is a Clayton Dynamometer to handle any engine with a rotating shaft.

Complete engine handling equipment is also as a package for mounting and connecting engine for Dynamometer test. Designed for fast, efficient and economical testing of all gasoline or diesel engines.

UNIVERSAL TRACTOR TEST EQUIPMENT

Designed for use with Clayton Engine Dynamometers, the Universal Tractor Test Equipment can be installed to test Tractors only, or can be installed in combination with Clayton Universal Engine Stand to provide complete facilities to test basic engines, power units equipped with mechanical clutches or torque converters, Tractors and heavy duty rubber tired construction vehicles equipped with power take-off drives.

Easy to use and enables tractor service operator to check and performance test engines after repair without removal from tractor.

Clayton **CLAYTON MANUFACTURING COMPANY**
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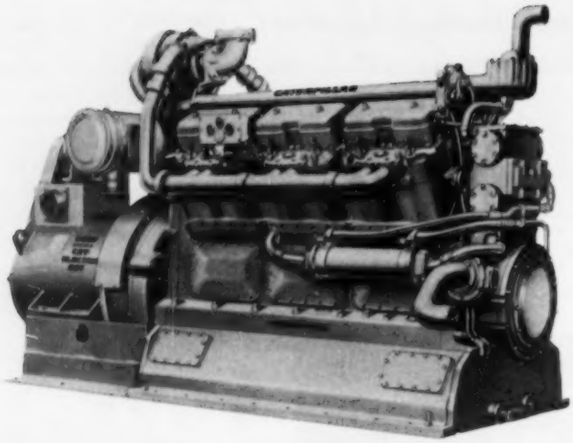
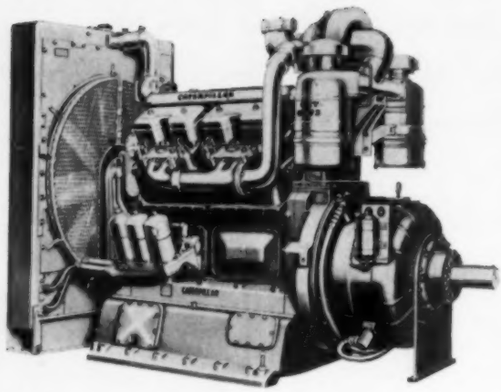
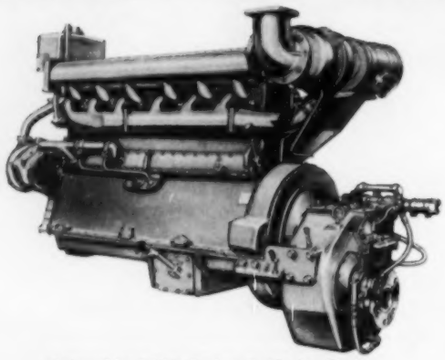


Caterpillar D397 Series D Electric Set

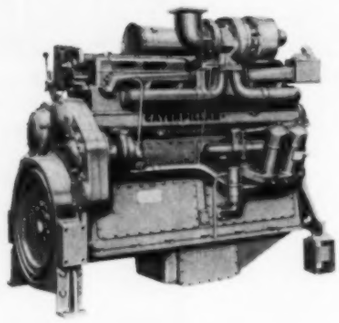


Caterpillar D375 Series D Industrial Engine, Torque Converter Power Unit

AIRESEARCH TURBOCHARGER SYSTEMS



Caterpillar D342 Series C Marine Engine



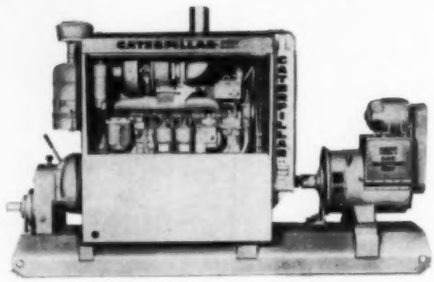
Caterpillar D353 Series C Industrial Engine

DESIGNED FOR CATERPILLAR ENGINES

Through the close cooperation of AiResearch and Caterpillar, advanced turbocharger systems have been developed to match each of these production diesel engines covering a wide range of horsepower and applications.

Engine horsepower has been substantially increased to meet higher power demands without penalty of larger size and more weight. For example, the intermittent 415 H.P. Caterpillar D397 industrial engine has been turbocharged to 575 intermittent H.P. (650 H.P. maximum) ... 200 intermittent H.P. Caterpillar D342 industrial engine turbocharged to 260 intermittent H.P. (320 H.P. maximum).

Other important advantages of the AiResearch air-cooled turbochargers: increased horsepower to sea level rating ... lower specific fuel consumption ... less smoking and noise ... cleaner and cooler running engine ... reduced maintenance costs.



Caterpillar D337 Series F Mechanical-Electrical Engine

These advanced turbocharger systems underwent thousands of test hours on the job by Caterpillar and are now in quantity production.

AiResearch is the most experienced company in the design, development and production of small turbomachinery. We will be happy to discuss turbocharger applications for your equipment.

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

THERMO KING ORDERS 1500 DIESELS FOR REEFERS

Minneapolis Firm Buys Small Mercedes-Benz OM 636 Engines to Power Trailer Refrigeration Units: P. I. E. Will Get Approximately 100 Units

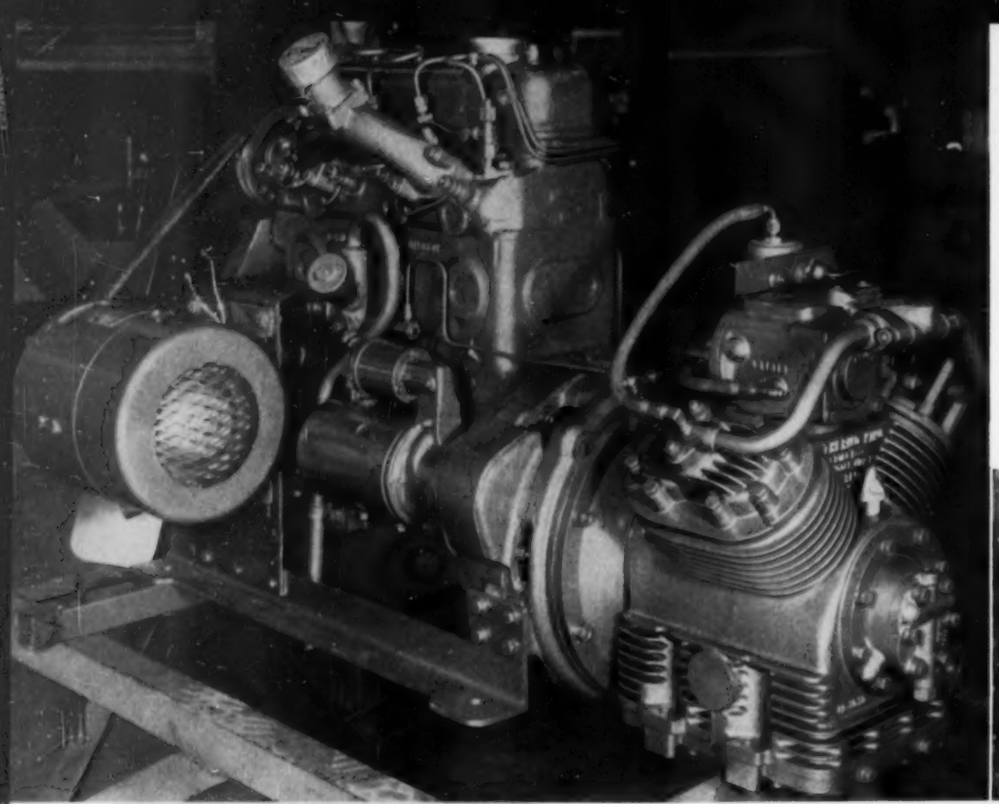
By J. W. BROWN

ONE of the largest single orders for truck refrigeration diesels announced to date was placed recently with the Utica Division of the Curtiss-Wright Corp., by the Thermo King Corp., Minneapolis, Minn. The order calls for 1500 Mercedes-Benz model OM 636 diesel engines for 1500 model UWD-30 Thermo King "undermount" refrigeration units. These units can refrigerate the largest size trailer permitted on over-the-road hauls. Approximately 100 of the first of these units will go to P.I.E.—Pacific Intermountain Express— famous west coast transportation company.

The Thermo King Corp. is a leader in highway refrigeration equipment. It has been in this business since 1937, when as the U. S. Thermo-Control Company it introduced its first refrigeration unit to the trucking industry. Today it constructs 14 different basic models with many variations for the trucking industry. It also manufactures specialized air-conditioning units for transit buses and a large variety of air conditioning and refrigeration units for the armed services. The company designs and manufactures most of the components used in its refrigeration equipment, including the con-

Joseph A. Numero (left), president of Thermo King Corp., signs an order for Mercedes-Benz diesel engines for Carl Pearson, industrial engine sales manager of the Utica Division, Curtiss-Wright Corp.

Typical reefer trailer is this Strick aluminum semi, ready for the road with a Thermo King undermount refrigeration unit powered by a Mercedes-Benz OM 636 engine.



MODEL OM 636 MERCEDES-BENZ DIESEL

NUMBER OF CYLINDERS	4
BORE & STROKE (in.)	$3^{15}/_{16}$" x $3^{15}/_{16}$"
PISTON DISPLACEMENT (cu. in.)	107.8
SHAFT ROTATION-FLYWHEEL END	Cntr. Clockwise
HORSEPOWER	36
COMPRESSION RATIO	19 : 1
LUBRICATION	Forced Feed
HEAT REJECTION-H_2O TO OIL BTU/MIN	1520
LUBE OIL CAPACITY IN QUARTS	6¼ qts.
APPROX. DRY WEIGHT WITH STANDARD ACCESSORIES	400 lbs.

Specifications, Mercedes-Benz OM 636 diesel engine.

trols, the evaporator and condensor coils; the high precision, lightweight compressor; starter; generator; and others.

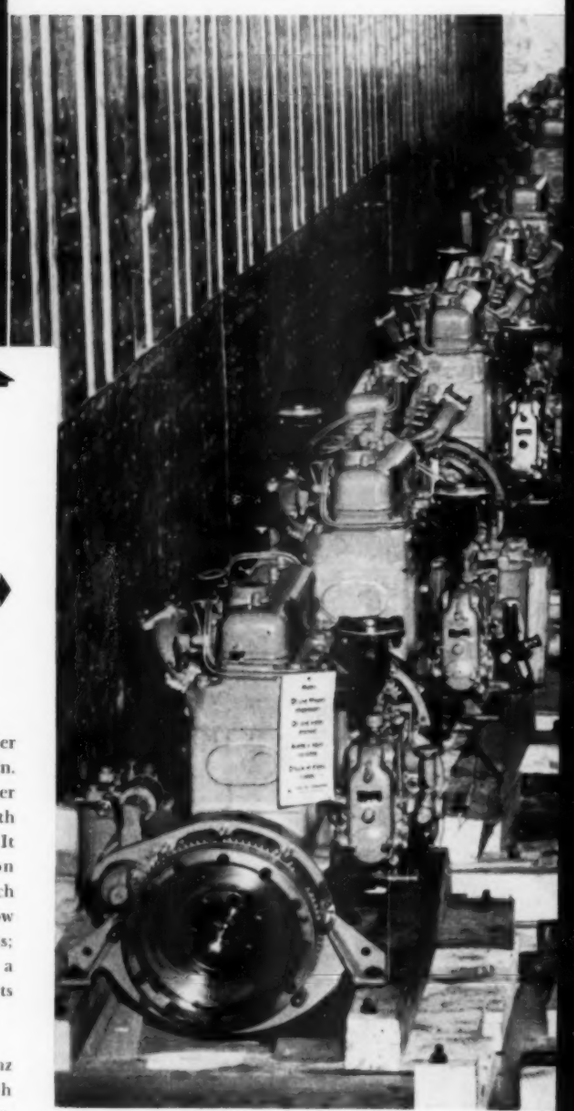
The large order recently placed with Curtiss-Wright Corp., which is the exclusive distributor for Mercedes-Benz engines in North America, is evidence of the growth of refrigerated truck transportation and of the rapidity with which diesels are replacing gasoline and LP gas engines in such applications. The trend to diesels is possible because of the availability of smaller, relatively light diesel engines with suitable horsepower output. M. S. Sutton, chief engineer of Thermo King, said that his firm chose the Mercedes-Benz OM 636 because "it starts easily, is exceptionally clean burning and delivers the right horsepower to cool the largest truck permitted on the road without waste and excess capacity."

The Mercedes-Benz OM 636 diesel engine is the same model used to power the Mercedes-Benz passenger car. It is a 4-cylinder, 4-cycle, vertical, liquid-cooled engine producing from 20 to 36 bhp. with a bore of only $2\frac{13}{16}$ in. (stroke $3\frac{15}{16}$ in.), it has one of the smallest cylinder sizes of any industrial or automotive diesel manufactured. Its total displacement is 107.8 cu in., with about 26.9 cu in. per cylinder. The OM 636 is approximately 23 in. wide, 27 in. long and 28 in. high with air cleaner in normal position. It has a dry weight, with standard accessories, of approximately 400 lbs. It incorporates the Daimler-Benz precombustion chamber. Other features include Robert Bosch injection pumps and nozzles; Fram filters; glow plugs for cold-weather starting; aluminum pistons; chrome-nickel alloy cast iron cylinder blocks; a cast light-metal oil pan and readily accessible parts and accessories.

In the UWD refrigeration unit, the Mercedes-Benz engine is mounted in an enclosed frame beneath the trailer, together with its radiator, the refrigeration compressor and an ac generator which supplies the power for three ⅓ hp fans. This underbody refrigeration unit also includes a 12-volt battery, refrigerant tank, condensor coils, condensor fan and a control panel. The unit, which weighs 1250 lbs., is bolted to the underbody of the vehicle. A 315 lb. exaporator section is mounted separately in the front end of the truck or trailer of the UWD model. The evaporator section includes two ⅓ hp ac motor-driven fan and a coil through which the refrigerant passes and absorbs heat from the interior of the vehicle. The condensing section, in which the engine is mounted, is 28 in. high, 59 in. long and 35 in. wide; the evaporator section is 39½ in. high, 58½ in. wide and 20½ in. deep.

In its literature, Thermo King Corp. explains that a mechanical refrigeration unit does not produce cold; instead it functions as a device to remove heat from the enclosure. Flowing as a liquid (under pressure) through a liquid line, the refrigerant is metered through a small opening in an expansion valve, then passes through a distributor which distributes it to the various sections of the evaporator coil. As it enters the evaporator, the refrigerant is at low pressure and begins to "boil" or evaporate into gaseous form, absorbing heat. It then travels through a suction line to the compressor, where the gaseous refrigerant is again highly compressed. This highly compressed warm gas passes through a condensor coil where it is fan-cooled, giving off its heat to the outside air and turning again into liquid form, ready again to absorb heat as it passes through the evaporator.

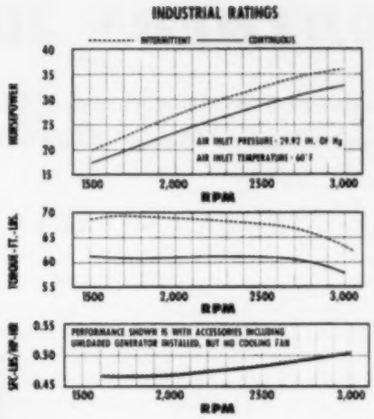
The function of the evaporator fan is to draw air from the lower part of the truck or trailer,



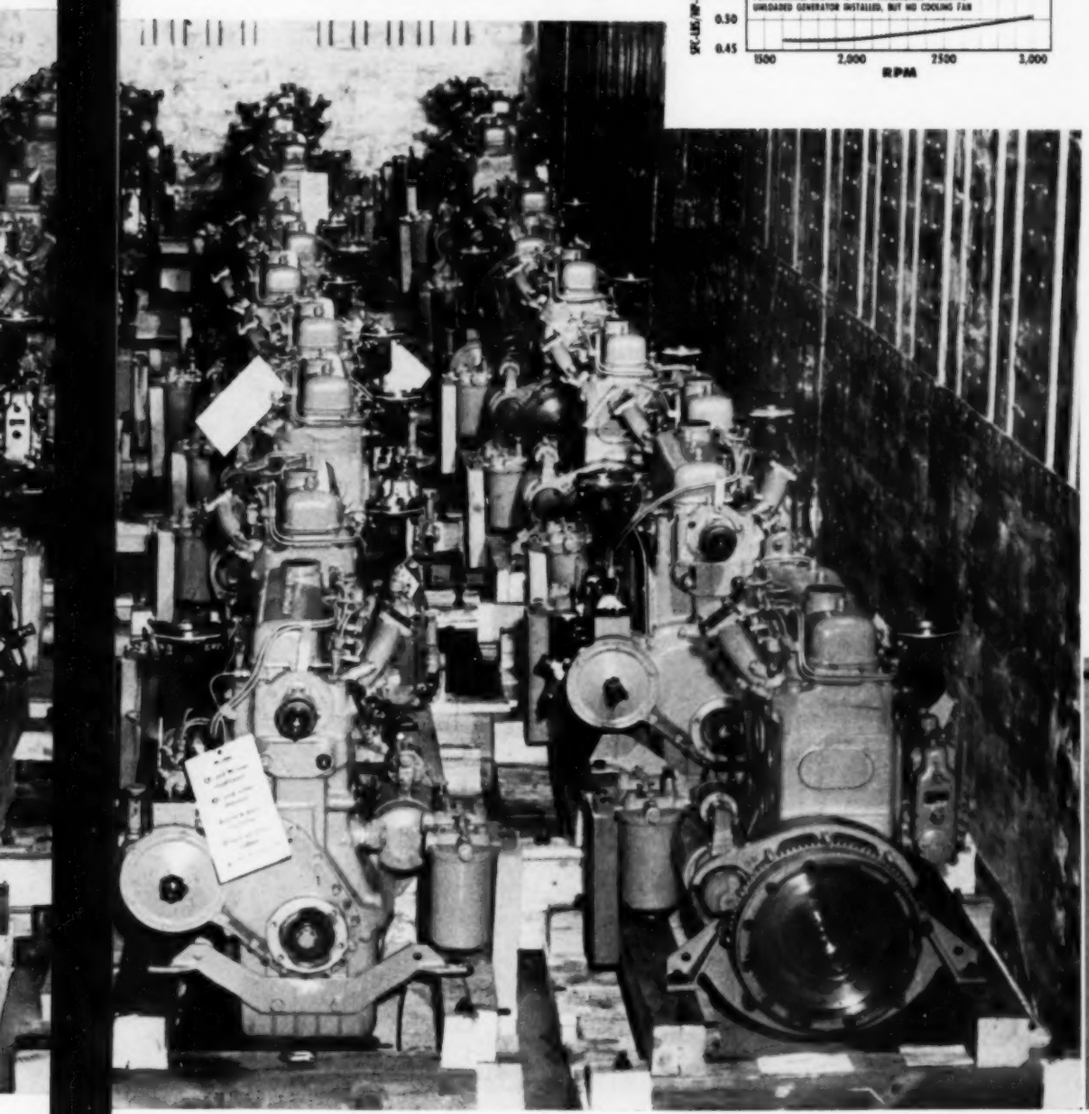
Mercedes-Benz OM 636 diesel engine with Thermo King compressor and belt-driven generator, ready for installation in a Thermo King UWD-30 refrigeration unit.

A trailer load of about 30 Mercedes-Benz OM 636 engines ready for shipment from the Utica Division, Curtiss-Wright Corp. plant near Utica, Mich. to the Thermo King Corp.

pass it over the evaporator coils for the removal of heat and to distribute it evenly throughout the enclosure. The chilled air is carried by a duct running back along the ceiling of the vehicle, from whence it passes through and around the perishable or frozen lading. No extensive change to a trailer is required to apply this type of refrigeration system because it is divided into two units which are connected only by two small refrigerant lines and control wiring. By installing a bulkhead in



Performance characteristics of Mercedes-Benz OM 636 engine.



the trailer, provision can be made to refrigerate only part of the cargo, or to keep two different sections of the trailer under different degrees of refrigeration. For the desired result, trailers must be properly insulated. Thermo King recommends at least three inches of good, non-packing insulation in walls, floor and roof for non-frozen products; six inches for frozen foods. Doors must be properly gasketed and should have breaker strips between inside and outside surfaces. To provide adequate cooling for every part of the load, vertical or slanted stripping must be fastened to walls and door of the vehicle and floor boards or deep-grooved corrugated flooring must run from front to rear with a "gutter" along the bottom of each side wall.

The Thermo King system is completely automatic. According to the demand, the engine governor is set automatically at "low speed cool" or "high speed cool"; this in turn regulates the engine speed at 1100 rpm or 2400 rpm. Defrosting, as needed, is also done automatically. The engine operates continuously after its initial (manual) starting. If outside temperatures below the setting of the thermostat are encountered the system automatically goes into a reverse cycle, operating at "low speed heat" or "high speed heat" as required. This is an important feature because perishable cargos are sometimes carried from warm climates into cold, as for example, from California into Canada or Alaska.

The OM 636 Mercedes-Benz diesel will reportedly provide refrigeration during a normal transcontinental trip on one 30-gal. tank of fuel, although larger tanks are available. The engine is relied upon to make possible continuous refrigeration during layovers or while a trailer is waiting to be hooked to a tractor in the trucking yard. High capacity of the Thermo King unit allows the produce to be loaded before it is chilled to optimum temperature. Chilling will take place en route.

The Thermo King Corp. has many trained servicemen stationed along the routes usually taken by its customers all over the world. Thermo King servicemen in these locations will also assume responsibility for the maintenance of the Mercedes-Benz diesel engines. Curtiss-Wright specialists in parts and service have provided the necessary training to Thermo King personnel. The June issue of DIESEL PROGRESS told of other manufacturers, the builders of "Transicold" and "Tropic-Aire" mechanical refrigeration units, going in strongly for diesel units. Word of Thermo King's large order for Mercedes-Benz engines further confirm's that truck refrigeration is a promising new field for the diesel.

External control panel of UWD-30 Thermo King refrigeration unit showing engine controls, Hobbs hour meter and refrigeration instruments.

3200 HP *NORTHERN* JOINS FLEET

Dravo 3200, Powered by 16-Cylinder Cleveland Diesel Engine, Becomes Union Barge Line's 11th Towboat

By DOUGLAS SHEARING

A NEW 3200 hp diesel towboat, the *Northern*, has been added to the fleet of Union Barge Line Corp., Pittsburgh, Pa. One of Dravo Corporation's stockbuilt 3200 class boats, the *Northern* will operate over most of the UBL system, pushing mixed tows between Pittsburgh and New Orleans. Purchase of the new boat gives Union 11 towboats, four of them built during the last six years. "With our modern towboats," said Mr. L. P. Struble, UBL president, "we speed up delivery and can handle more cargo in a shorter time than ever before in our history."

The *Northern* is the third Dravo 3200 now in service. A fourth, not yet launched, has been sold and a fifth is available for early delivery. The *Northern* is 148 ft. long, 34 ft. wide and 10½ ft. deep. It is powered by two 16-cylinder GM Cleveland diesel model 16-567C engines driving through a Falk 21MB reverse and reduction gear. An auxiliary engine, a model 6061A GM Diesel, (120 hp at 1200 rpm), drives a 60 kw Delco generator.

Dravo developed the *Northern's* hull lines and Kort nozzle design as the result of its research and model basin testing programs both in the United States and Holland. The *Northern* has an hydraulic steering system and is equipped with all modern navigational aids, including radar and ship-to-shore telephone. The boat easily can push tows of 20 or more loaded barges at speeds in excess of 6 mph.

Operating throughout the Mississippi River system and the Gulf Intracoastal Waterway, Union Barge Line owns 300 barges of all types, including one of the largest tank barge fleets on the inland waterways. The line also operates a number of barges under charter and tows many others that are customer-owned. These tows are handled by Union's fleet of 11 towboats. The company's four newest boats are also its most powerful. In addition to the *Northern*, they include the 3250 hp *Southern*, built in 1953, and the 3250 hp *Eastern* and *Western*, built in 1956. Here is the complete lineup of Union Barge Line's fleet of diesel driven

Underway on the Ohio River with a 20-barge mixed tow is Union Barge Line Corporation's newest diesel towboat, the *Northern*. The 3200 hp vessel is one of the Dravo Corporation's stock-built 3200 class boats. UBL, which will operate the *Northern* between Pittsburgh and New Orleans, now has 11 towboats.

towboats (all boats are twin-screw, twin engine):

Northern, 3200 hp with 16-cylinder GM Cleveland engines; *Eastern,* 3250 hp with 8-cylinder supercharged White Superior engines; *Western* and *Southern,* same power as *Eastern.*

Peace, 1450 hp with 12-cylinder GM Cleveland engines; *Pennsylvania,* 2240 hp with 8-cylinder White Superior engines; *Reliance,* same power as *Pennsylvania.*

Lehigh, 2260 hp with 8-cylinder White Superior supercharged engines; *Cornell,* same as *Lehigh; William Penn,* 1400 hp with 8-cylinder White Superior engines; *Liberty,* 2250 hp with 16 cylinder GM Cleveland engines.

Principal Equipment Serving Towboat *Northern*

Main engines (2)	GM Cleveland Diesel
Auxiliary engine	GM Diesel
Intake air cleaners	Air-Maze
Auxiliary generator	Delco
Air starter	Ingersoll-Rand
Reverse reduction gear	Falk
Governor	Marquette
Controls	Westinghouse Air Brake
Fuel oil strainer	Zurn
Fuel oil transfer pump	Roth
Lube oil filter	Briggs
Strainer	Cuno
Sump strainer	Sarco
Cooler	Ross
Heat exchanger	Ross
Thermostatic controls	Amot
Alarm contacters	Detroit Lubricator
Exhaust muffler	Maxim
Exhaust pyrometer	Bristol
Switchboard	Lake Shore
Instruments	General Electric
Alarm panel	Dravo
Water filtration	Cuno

Engine room of the *Northern* shows twin GM Cleveland diesel model 16-567C engines, each capable of developing 1600 hp. Engines are equipped with Falk reverse-reduction gears. Note Air-Maze intake air cleaners.

Pilot house of the *Northern* is equipped with radar, ship-to-shore telephone and other navigational aids. The towboat has Westinghouse Air Brake controls.

Lower engine room shot of the *Northern* shows Lake Shore switchboard in rear.

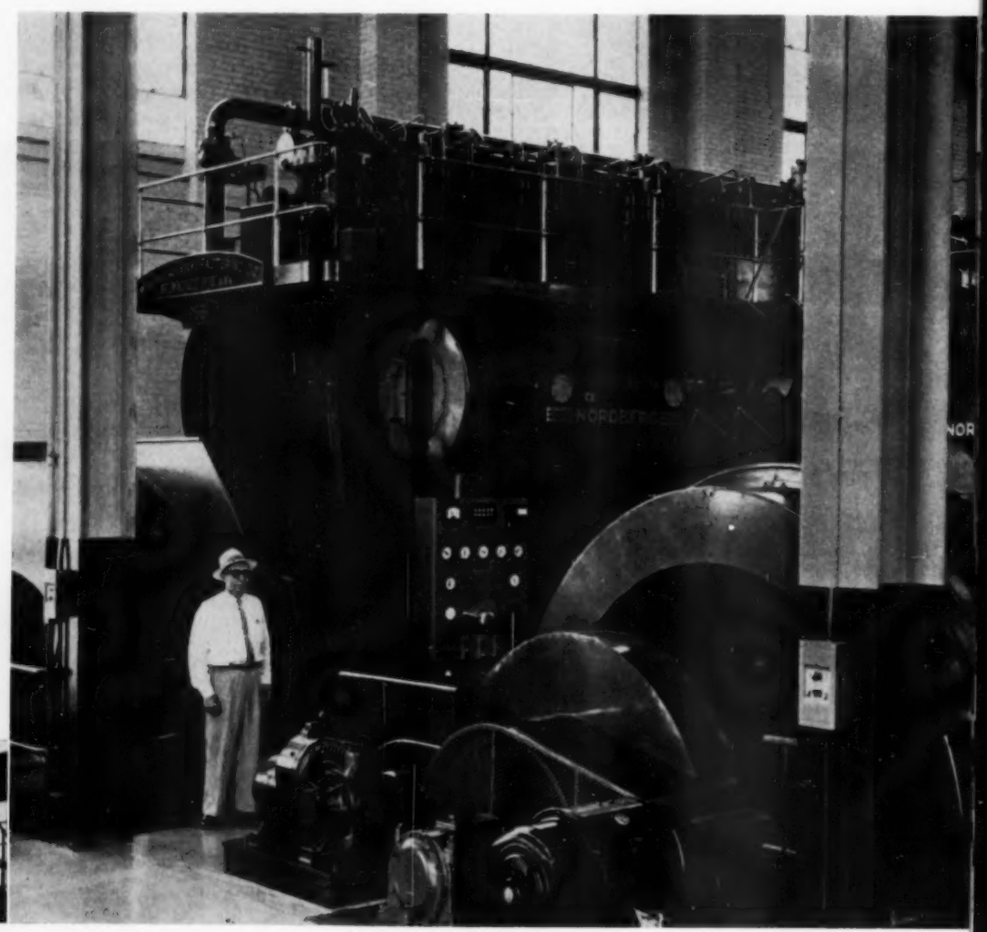
PONCA CITY HAS LARGEST DUAL FUEL

World's Largest Duafuel Diesel, an 8500 HP Nordberg, Joins 8 Other Nordberg Engines in Oklahoma Municipal Plant to Produce 55 Million KWHS in Year at Total Production Cost of 5.67 Mills Per KWH; Net Profit for 10 Years Exceeds $7 Million

THE world's largest dual fuel diesel engine is helping the Ponca City (Okla.) municipal power plant to attain new records in production volume, operating economy and profits. The engine is an 8500 hp Nordberg Duafuel unit. It and eight smaller Nordbergs in the Ponca City plant produced a total of 55,826,003 kwhs in the fiscal year ended June 30, 1958 at a total production cost of 5.67 mills per kwh. Net profit was $920,582.52. A growing Ponca City needed the big, new engine. When the oldest engine still in service—a 1250 hp Nordberg—was installed in 1924, peak load was little more than 1000 kw. Total production for the year was 3,402,165 kwhs. Units 1 and 2, also 1250 hp Nordbergs, were installed in 1928 when the peak load was still under 2000 kw and annual production was 7,680,790 kwhs. Next oldest engine still on the line is the 2250 hp unit installed in 1937 as an oilburning engine and converted 10 years later to dual fuel service. Peak load in 1937 was 3,200 kw and production was 10,921,500 kwhs.

Peak demand leveled off for the next seven years, although production volume edged upward. World War II brought a sharper rise. When the 2400 hp Nordberg Duafuel was installed in 1947, peak load had increased to 4750 kw and production to 22,070,500 kwhs. Two years later, a 3600 hp Duafuel engine replaced a 1250 hp unit to help carry the 6300-kw peak as output passed 24 million kwhs. In 1952, a 4275 hp Nordberg Duafuel went into service to meet a summer demand of 8300 kw and stroke, was put into service March 26, 1956, in time to help the plant meet a demand of 15,100 kw. With the new unit, the plant has a total installed horsepower of 29,910 and a net capacity of 20,920 kw.

On the basis of both size and efficiency, the big engine became the base generating unit of the plant. It can be run to advantage whenever plant load exceeds 3000 kw. The new unit shows virtually the same high efficiency all the way from half load to full load. With periods when even the late night load exceeds 3000 kw, the engine has run as long as 60 days without a halt. By the end of 1958, it had run 12,043 hours and produced 47,585,100 kwhs. Fuel consumption for the period was 51,694,000 cu. ft. of natural gas and 41,229 gal. of pilot oil, an average of 9.76 cu. ft. of gas and .0072 gal. of oil per kwh. Its gas consumption is believed contribute to a production total of 35,433,794 kwhs. In 1954, a 5135 hp Duafuel was added to the line. Peak demand had reached 11,700 kw; production was 45,948,200 kwhs. All factors pointed to continuing growth. Employment rose at Ponca City's two refineries and scores of small industrial plants. New housing starts accelerated, and demand for electrical appliances increased. So confronted, Ponca City contracted for the largest dual fuel engine built. This 10-cylinder Nordberg, rated 8500 hp at 180 rpm with 29-in. bore and 40-in.



At left is Ponca City's 8500 hp Nordberg engine, largest dual fuel diesel in the world. At the control station is Utilities Superintendent Pat Schlesinger. The engine drives a General Electric generator with V-belted exciter.

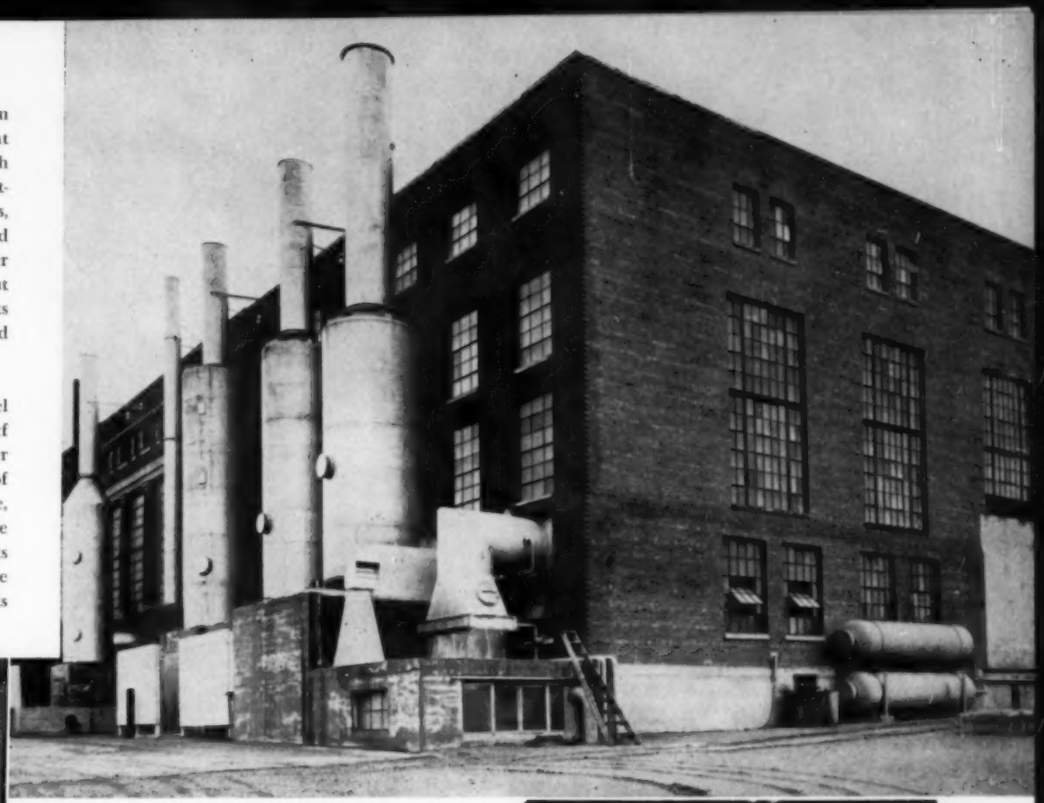
Superintendent Schlesinger is at the control panel of the 8500 hp Nordberg. On the Nordberg panel are: engine control lever, push-button controls for motor-driven auxiliaries, Alnor exhaust pyrometer, Viking alarms and Lonergan gauges.

to be lower. A single meter measures consumption for the entire plant, and it has been observed that averages are between 9.2 and 9.3 cu. ft. per kwh when the big engine is operating alone. Lubricating oil consumption was very low. In 36 months, the engine ran a total of 13,334 hours and used 12,402 gal. of lube, an average of 9131 hp/hr. per gal. No oil was added to the crankcase throughout 1957 and 1958. To restore crankcase oil to its original viscosity, 200 gal. of oil was removed and an equal amount of new oil added.

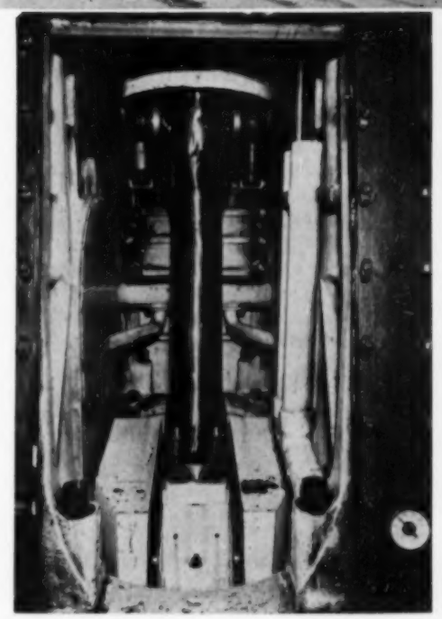
Ponca City is located close to an economical fuel supply. It pays an average of 17.5 cents per mcf for gas and 9.6 cents a gallon for pilot fuel. Other factors are apparent in the plant's low cost of power production. Consumption of fuel and lube, as previously noted, is low. Engine maintenance for the year cost $6,593.45, an average of 22 cents per installed horsepower; this in a plant where engine age ranges up to 35 years and three units

have well over 100,000 hours of service. Table on next page gives history of the plant's nine engines, showing size, date started, kwh generated, engine hours, lube and fuel consumed. Through 1958, these Nordbergs had served an aggregate of 644,786 hours and produced 670,540,734 kwhs. Four of the nine engines have been completely written off the books, yet continue to perform as well as they did when new.

In the fiscal year ended June 30, 1958, the nine



The Ponca City municipal power plant houses nine Nordberg diesels with combined capacity of 29,910 hp to provide electricity for a population of 30,000. The Maxim exhaust silencer at right serves the 8500 hp unit.



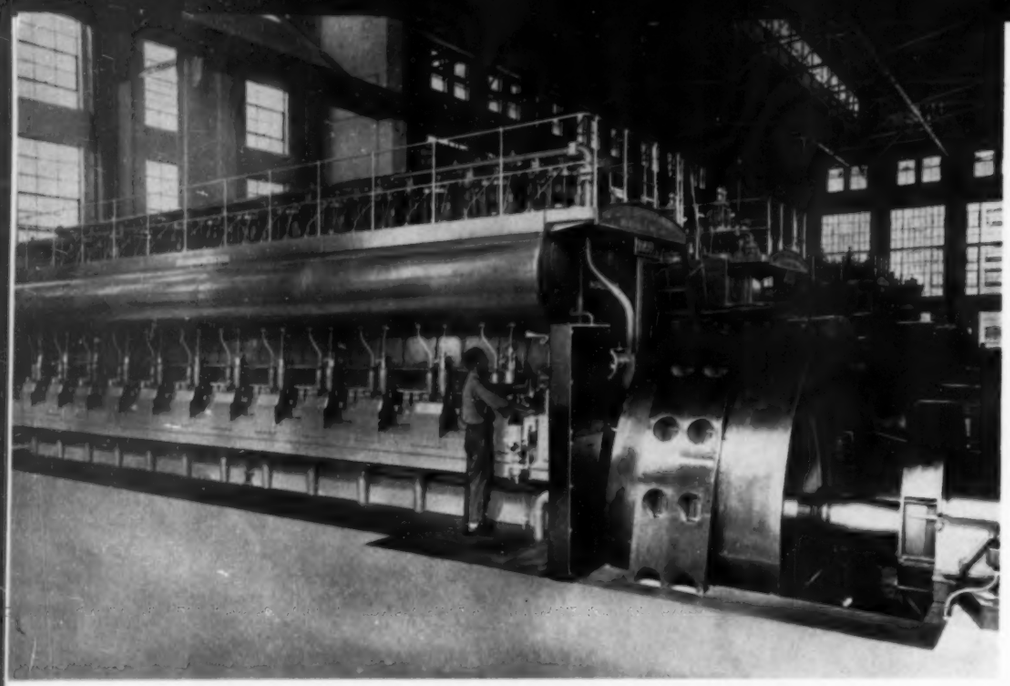
This view of inside the crankcase of the 8500 hp Nordberg after more than 13,000 hours of operation shows how clean the engine is. The original lubricating oil is still in the engine.

Nordbergs generated 55,826,003 kwhs at a total production cost (including depreciation) of $317,071.02. Here is the breakdown on the basis of cost per kwh:

Fuel (gas & oil)	2.36 mills
Plant salaries	1.16
Lube oil	.13
Engine maintenance	.12
Water, light, heat	.10
Plant renewals, repairs	.09
Supplies	.04
Total before depreciation	4.33 mills
Depreciation at 5%	1.34
Total production	5.67 mills

Continuing with fiscal 1958, costs of distribution totaled 2.79 mills per kwh and financial expenses (including interest and taxes) amounted to 1.43 mills. This brought total expenses of the light department to 9.89 mills. Ponca City's policy is to charge its consumers rates equal to the average of other Oklahoma cities. This brought in revenues of $1,473,836.28 and left a clear net profit for the year of $920,582.52 after accounting for the following expenses: Production, $317,071.02; distribution, $156,248.38; and interest and taxes, $79,934.38. In the last 10 years, power profits have totaled a whopping $7,017,119.03.

The big Nordberg Duafuel engine, smooth running and easy to operate, has been started and put on the line in less than four minutes. Normally, motor-driven auxiliary pumps for fuel, engine lube and blower lube are started by push buttons on the engine control panel before the big unit is turned over. But even with the entire plant shut down, the engine and its auxiliary equipment can be started with compressed air. An interlock blocks fuel from the engine until lube pressure is up and starting air off. Lubricating oil is circulated from a sump tank by one of two motor-driven vertical screw-type pumps. The auxiliary pump is operated by 220-volt station power, and the main pump runs on 2400-volt current from the engine's generator. The main pump takes over automatically when the engine is running. Included in the lube circuit are a pair of coolers—two fitted the space better than one large one. An activated clay, refill-type bypass filter has its own motor-driven pump so that it can be used even when the engine is shut down. An individual



Eight of the nine Nordberg diesels in the Ponca City plant are shown here. They have service records ranging up to 35 years. Average fuel cost in the last fiscal year was 2.36 mills per kwh. Unit in the foreground is a 21½ in., 12 cylinder engine rated 513 shp. Note American Bosch fuel injection pumps and Manzel lubricators.

force-feed lubricator serves each of the cylinders. Natural gas reaches the plant at 50 lb. pressure, passes through oil bath scrubbers and then regulators to reach the low pressure engines at 23 lb. and the older high pressure unit at 30 lb. The gas admission valve at each cylinder is controlled by an individual actuator pump. No. 2 diesel oil is used as pilot fuel. Delivered in tank-car lots, the oil is unloaded into a pair of 10,000-gal. storage tanks, then pumped to a small overhead day tank in the plant. The fuel flows by gravity to the fuel supply pump. The auxiliary fuel pump is motor-driven, but the main fuel pump is chain-driven off the engine—another element to make it self-sufficient. From the fuel pump, oil goes through filters, then through a header to a pair of fuel pumps near each cylinder head. One, with a displacer valve, handles pilot oil for dual-fuel operation. The other pump is always engaged, but the rack is set so that it does not deliver oil when the engine is on gas. The actuator pump rack is set so that the pump can open the gas valve. If the engine control lever is switched to the oil position, the rack positions are changed so that gas valves remain closed, the pilot oil pump increases the volume of fuel delivered, and the second fuel injection pump begins to deliver oil. This is accomplished automatically if the gas supply fails.

A single motor-driven centrifugal pump circulates soft water through a shell-and-tube heat exchanger, the engine jackets and a 20-in. diameter surge tank which extends up 42 ft. above the level of the pump. This arrangement reduces horsepower requirements for pumping and completely eliminates the need for an auxiliary jacket water pump. If the main pump fails, thermal syphon action keeps the water flowing. Utilities Superintendent Pat Schlesinger, who designed the system, calculates that the engine can run safely for 30 minutes without a pump. This is the third engine he has set up this way. He has never had a cracked cylinder head. Streamlined piping was fabricated on the site. Raw water for the plant is circulated by five motor-driven centrifugals to a 40 ft. high louver-type atmospheric cooling tower. A motor-driven blower is used in extremely hot weather to increase the tower's cooling capacity.

Scavenging air for the big two-cycle engine is drawn into a large chamber through filter panels to the suction of the motor-driven blower. Driven at 3575 rpm by a 750 hp motor, the blower delivered on test 51,500 cfm with a 14.1 psia intake pressure and a 16.3 psia discharge. Shutters on the blower suction are controlled by engine exhaust temperature. The blower motor is powered directly from the engine's generator. Air is drawn through evaporative cooler screens to the blower and then to a water-cooled intercooler. Exhaust gases vent through a vertical silencer mounted over the air suction chamber. Located between silencer and engine, a sliding expansion joint with two piston rings prevents escape of gas. The plant always has plenty of starting air. In addition to the two large tanks put in with the big engine, air can be drawn from five other tanks.

The two-cycle Duafuel engine drives an 8750 kva, 7000 kw, 3 phase, 60 cycle, 12,470 volt generator with 75 kw V-belted exciter. Allowing for overloads and for power used directly to drive the blower and other auxiliaries, net capacity of the unit is figured at 6000 kw. The engine has been trouble-free. When pistons were pulled for inspection early in 1959 after 12,000 hrs. of operation, the engine was found to be in excellent condition. Some rings and gaskets were replaced at a total cost of less than $500.

Principal Equipment Serving 8500 HP Nordberg Engine

Engine	Nordberg
Generator	General Electric
Governor	Woodward
Fuel oil	Cities Service
Fuel injection pumps	American Bosch
Fuel supply pumps	Roper
Fuel filters	Nugent
Air filters	American Air Filter
Blower	American Blower
Blower motor	General Electric
Intercooler	Young Radiator
Cooler screens	Alton
Lubricating oil	Conoco
Lube pumps	DeLaval
Lube coolers	Ross
Lube filter	Hilliard
Cylinder lubricators	Manzel
Jacket water pump	Fairbanks-Morse
Heat exchanger	Ross
Exhaust silencer	Maxim
Starting air compressor	Gardner-Denver
Piston rings	Safety Seal
Control panel	Nordberg
Alarms	Viking
Exhaust pyrometer	Alnor
Gauges	Lonergan
Thermometers	QualiTherm
Exhaust expansion joint	Nordberg

A totally enclosed, completely equipped General Electric switchboard serves the plant.

Operating Record of Ponca City's Nine Nordbergs Through 1958

Eng. No.	HP. Rating	Date Started	KWHS Generated	Engine Hours	Lube Oil Crankcase	Lube Oil Cylinder (Gal.)	Fuel Oil (Gal.)	Gas MCF
1.	1250	5/15/28	48,974,400	84,466		9,240	4,652,213	—
2.	1250	5/15/28	60,838,600	105,140		11,387	5,828,044	—
3.	1250	Feb. '24	71,248,170	118,820		23,573	7,011,908	—
4.	3600	5/19/49	123,615,014	65,381		26,691	511,581	1,174,237
5.	2250	11/7/37	101,401,200	113,156		27,117	6,173,743	423,820
6.	2400	1/5/47	81,763,000	88,368		23,348	501,003	900,199
7.	4275	6/4/52	79,981,750	37,162	4,954	21,748	377,123	812,822
8.	5135	3/30/54	55,133,500	20,250	1,990	14,197	348,885	572,470
9.	8500	3/26/56	47,585,100	12,043	550	10,624	344,215	464,553

LIGHTWEIGHT AIR COMPRESSOR FOR AUTOMOTIVE, INDUSTRIAL DIESELS

Single Cylinder 12 cu. ft. Design Offered in New Cummins Unit, Which Has Simplified Air Intake and Outlet Assembly, Integral Crankshaft and Accessory Drive

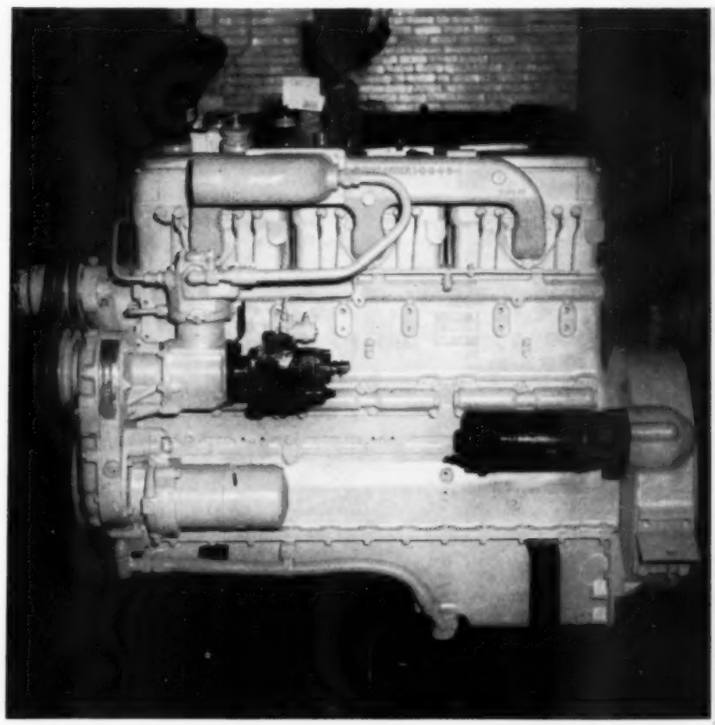
A new lightweight air compressor for automotive and industrial applications has been announced by Cummins Engine Co. Cummins engineers report that this new air compressor offers the following user benefits: 5 to 20 lb. weight saving; single cylinder 12 cu. ft. capacity design; simplified single air intake and outlet assembly; integral crankshaft and accessory drive.

The design of the integral crankshaft and accessory drive makes the Cummins air compressor installation short and compact. The weight reduction is a direct result of the compressor's integral design, which eliminates the necessity of a separate accessory drive. Its simplified combination intake and exhaust valve assembly can be replaced quickly without removing the compressor from the engine. The intake and exhaust valve are combined in one unit assembly, with the intake valve seated directly above the exhaust valve. This is unique in design and is compact. The valve parts and their sequence of assembly are shown in the accompanying blown-up view of the compressor.

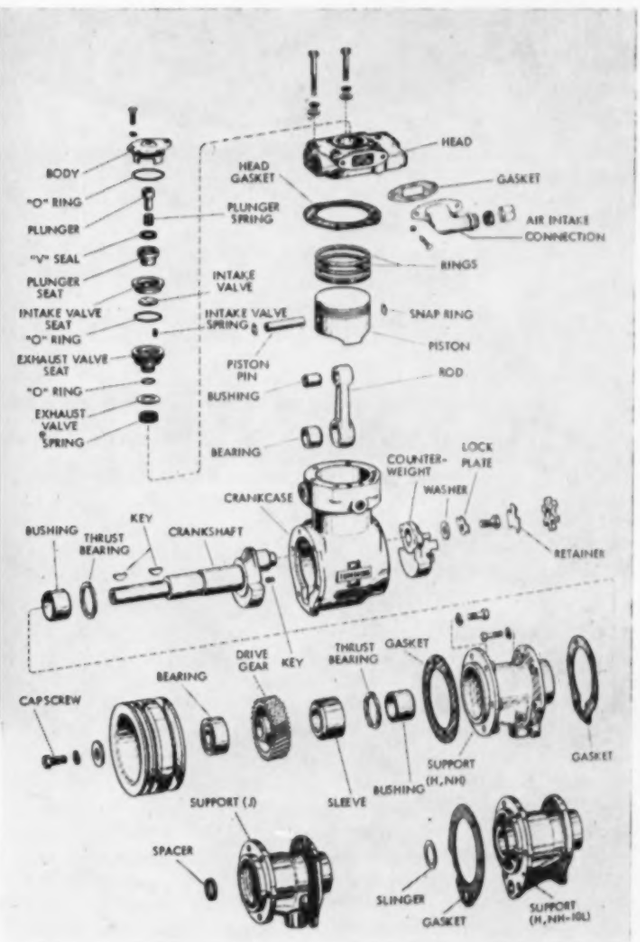
The compressor is available for all Cummins H, NH and six-cylinder J and C series engines. It has been put into production after intensive research and development in addition to nearly 3 million miles of field testing. The tests were conducted in the fleets of large and small operators, as well as many off-highway trucks. The air compressor is driven by the engine timing gear train and is water cooled. Its crankshaft and bearings also serve as the shaft and bearings for the accessory drive. The Cummins PT fuel pump is mounted directly behind the compressor. The compressor will become standard equipment on Cummins engines Nov. 1, 1959. Compressor specifications are:

1. Air delivery		12 cfm
2. No. of cylinders		One
3. Bore		$3\frac{7}{16}$ in.
4. Stroke		1.9 in.
5. Weight	J Series	47 lbs.
	H and NH	50 lbs.
	H and NH (I.O.L.)	50 lbs.
6. Dimensions:		
Length	H and NH	9 in.
	H and NH (I.O.L.)	$9\frac{1}{8}$ in.
	J Series	$9\frac{3}{16}$ in.
Height	All Series	$12\frac{5}{8}$ in.
Width	All Series	$7\frac{1}{2}$ in.

Cooling is by water from the engine; lubrication also is from the engine. Drive is integral with the crankshaft and speed is engine speed. Included in NH engine series are the 180 hp to 335 hp Turbodiesel engines. The I.O.L. designation refers to new production engines with internal oil lines.



View of new Cummins air compressor installed on an NH engine. Note compact size of compressor and close-coupled installation of PT fuel pump on back of compressor.



Blown-up view of compressor. Note intake and exhaust valve assembly at upper left and integral crankshaft and accessory drive design.

Driver climbs into a 190-D, one of two Mercedes-Benz taxis being tested by Yellow Cab Co. of Los Angeles.

DIESEL TAXIS PASS LOS ANGELES TEST

Two Mercedes-Benz and Four Perkins-Plymouth Cabs Roll Up Smog-Free Mileage; Average 26 mpg —Twice as Much as Gasoline-Engine Units

By JAMES JOSEPH

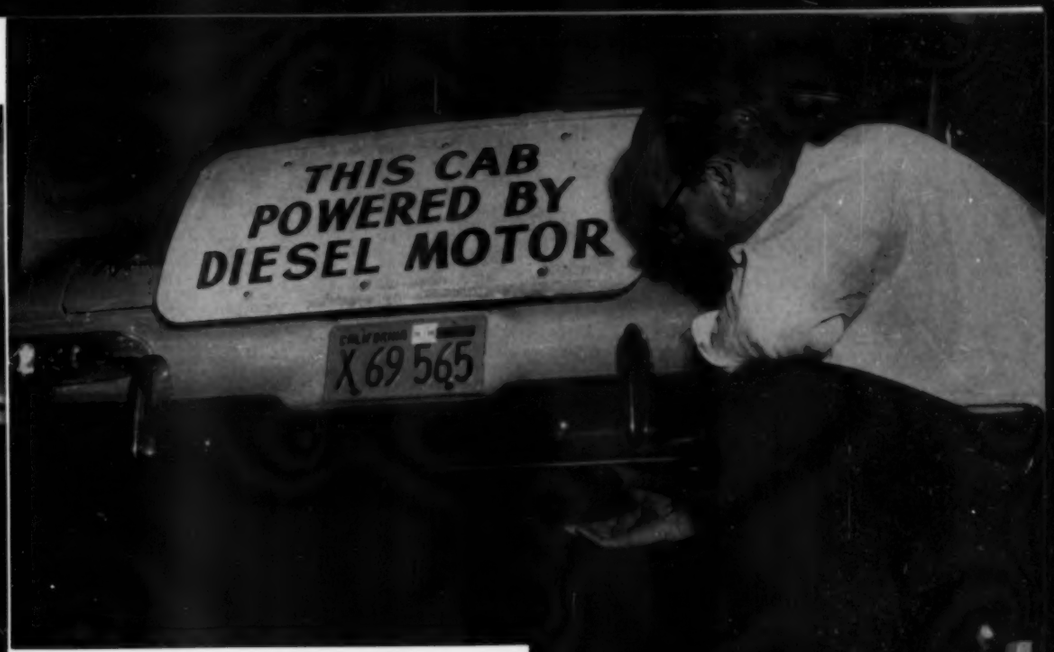
"THIS CAB POWERED BY A DIESEL MOTOR" proclaims a placard on six brand new Yellow Cab Co. of Los Angeles taxis. The six cabs —four 1959 Plymouth Savoys powered by Perkins P-4C diesel engines and two Mercedes-Benz 190-D's —have been negotiating Los Angeles traffic since June. They have been averaging 26 mpg, twice the mileage of the company's more than 1000 gas-engined cabs (which in 1958 averaged 13.11 mpg). Bolder than mileage statistics, however, have been findings which in smog-conscious Los Angeles make as much sense as dollars: Yellow Cab's six diesels were adjudged all but smogless, after tests by Los Angeles' powerful Air Pollution Control District and by a research independent, Truesdail Laboratories, Inc.

The Air Pollution Control District's findings, released in May, said: "The Mercedes-Benz 190 and Plymouth-Perkins diesel automobiles produced substantially reduced concentrations of carbon monoxide, total olefins and hydrocarbons . . . during all phases of engine operation . . ." The Air Pollution Control District's chief, Smith Griswold, declared that the diesels produced "far less smog-forming hydrocarbons" than their gasoline-engined brethren. Roger W. Truesdail, president of Truesdail Laboratories, summed up: "These diesels produce the lowest hydrocarbon content we have ever found with an automobile engine."

The fact is that neither research groups—both diligently in pursuit of smog contributors—had, until Yellow's experimental diesels, tested a really small automotive diesel engine. When they did, their mutual surprise was mirrored in a five-page report issued by the APCD. The Control District's researchers found, for example, that when idling the Mercedes' and Perkins' exhausts contained but 20 parts per million of hydrocarbons (see Table No. 1). By comparison, the exhaust from a six-cylinder gasoline "control" engine contained 470 ppm, or nearly 25 times the contaminants (see Table No. 2). But it was in deceleration tests that the little diesels amazed researchers. Hydrocarbon content from diesel exhausts tested 10 ppm. A staggering 5600 ppm of hydrocarbon contamination was found spewing from the gasoline engine.

Said a Yellow Cab of Los Angeles spokesman: "When we put these six diesel taxis on Los Angeles streets, we hoped for real economy of operation . . . but we never suspected that in the diesel we had an all but smogless engine." Both surprised and pleased, Yellow announced that if the public accepts diesel cabs, the company would gradually replace its fleet of 1000 gasoline cabs. Such replacement would be a bold public relations move in a community where smog is a dirty word—and a definite irritant.

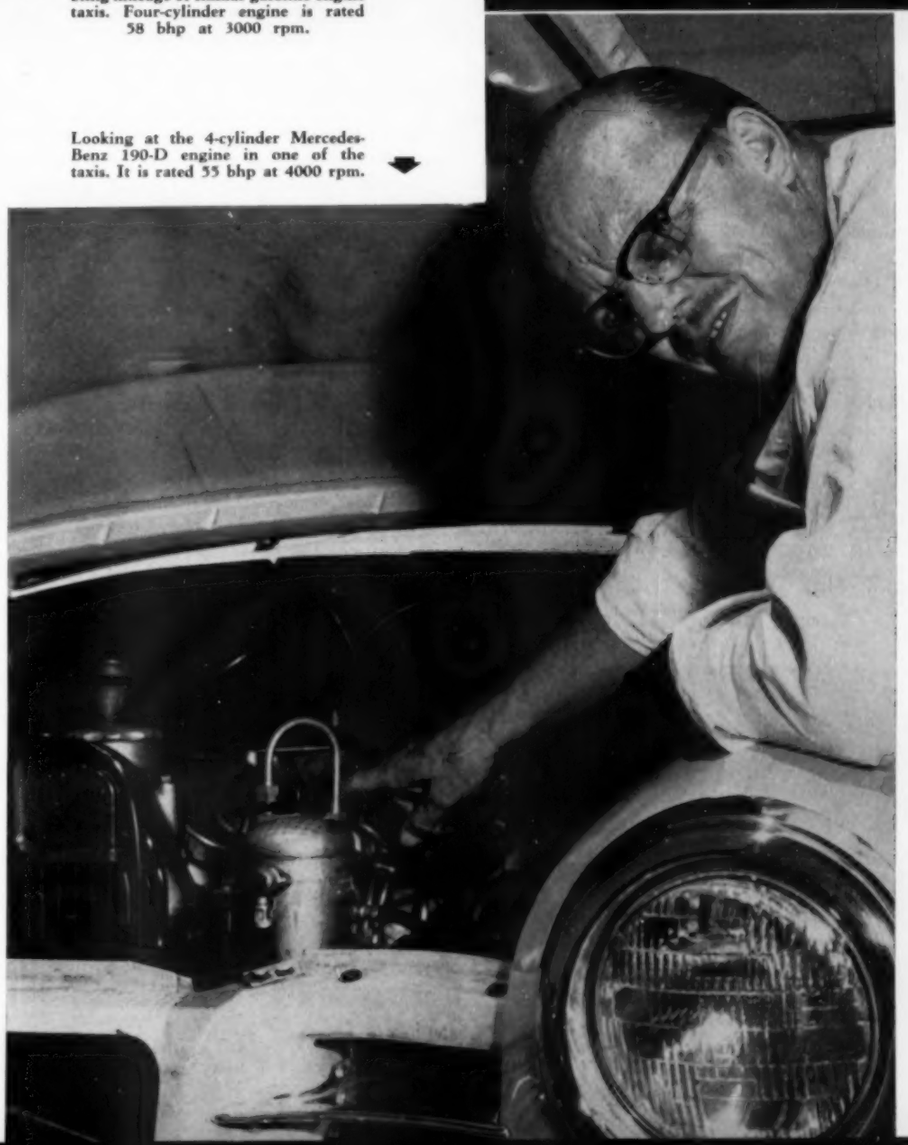
Although first costs of diesel taxis are considerably higher than gasoline cabs, Yellow could find itself in good position should installation of anti-smog



Placard on back of Plymouth taxi proclaims that it is powered by a diesel.

Perkins P-4C diesel engine in this Plymouth Savoy cab has been doubling mileage of similar gasoline-engine taxis. Four-cylinder engine is rated 58 bhp at 3000 rpm.

Looking at the 4-cylinder Mercedes-Benz 190-D engine in one of the taxis. It is rated 55 bhp at 4000 rpm.



exhaust devices become mandatory. Said one company official: "Within the next few years it is probable that every car in Los Angeles will be required to muzzle its exhaust. Devices proposed to date have all been costly . . . priced in the $300-$500 range. If these small automotive diesel engines are as pollutant-free as the Control District finds, it is possible that they may be exempted from anti-smog exhaust devices. The savings—for a fleet as big as ours—would be huge."

Such savings are in the future. Yellow Cab of Los Angeles currently is more concerned with the year-long results it expects to have on file by the time its dieselized cabs have run up 50,000 to 80,000 miles. 'We won't know the dieselized economies for another 10 months, at least," said Sid Henderson, superintendent of maintenance. In June, Yellow's six dieselized cabs averaged 25.7 mpg. The fleet average during the same month of strenuous in-town driving was 13.04 mph.

Although Yellow's diesels should more than halve fuel costs (especially considering diesel fuel's lower price), fleet men concede that it would take many bonus miles and maintenance to overcome high first costs. Yellow paid $3600 for its Mercedes-Benz cabs and about $2900 for the Plymouths with Perkins engines. By comparison, it spends $2100 for a standard Plymouth cab bolstered by about 30 heavy-duty parts not found in showroom models. Regardless, Yellow Cab executives are optimistic. "If we didn't think that dieselized cabs—both mileage and maintenance-wise—could close the first-cost price gap, we'd never have put them on the street in the first place," said one vice president. "The smogless feature," said another executive, "will carry a lot of weight." George Worster,

Drivers say that diesel cabs handle like any others, but they must learn to pull glow-plug starter, shown here on dash of Mercedes-Benz 190-D.

Table No. 1

BASIC TEST DATA-TAXI DIESEL ENGINES

Phase of Engine Operation	MPH	Automobile (Engine)	Measured Horsepower	CO_2 in %	CO in %	Hydrocarbon Conc. in PPM	Aldehyde Conc. in PPM	Oxides of Nitrogen Conc. in PPM
Idle	-	Mercedes Perkins	- -	2.3 1.7	0.0 0.1	20 20	40 13	
Cruise	30	Mercedes Perkins	8 8	8.8 5.4	0.0 0.0	25 30		
Acceleration	30	Mercedes Perkins	13 25	12.2 10.9	0.0 0.0	20 30	17 6	183;298 801;595
Acceleration	50	Mercedes Perkins	16-17 26	13.2 11.8	0.1 0.1	25 35		
Deceleration	30	Mercedes Perkins	- -	0.1 0.0	0.0 0.0	10 10		

Yellow Cab president, emphasized that his company makes no claim that the adoption of diesels, even in a fleet of 1000, would clear up Los Angeles' skies. "We do think that we're helping the situation a bit, though," he said.

While Yellow's switch to diesels, if it ever comes, lies in the future, the findings of the Los Angeles Air Pollution Control District are encouraging other smog-ridden cities to closely examine the small automotive diesel. The Air Pollution Control District's test report LT-49 of May 1959 says: "The vehicles were placed upon the Automotive Combustion Laboratory's chassis dynamometer and subsequently tested under controlled conditions. The five phases of engine operation and respective speeds utilized in these tests were as follows: idle; cruise, 30 mph; acceleration, 30 mph; acceleration, 50 mph; and deceleration, 30 mph."

The report continues: "A sampling probe was inserted into the tail pipe of each vehicle to provide access for sampling. Concentrations of carbon dioxide, carbon monoxide and total hydrocarbons . . . were measured continuously with non-dispersive infrared analyzers. Exhaust gas samples were collected in evacuated bulbs and analyzed for total oxides of nitrogen by the phenoldisulfonic acid procedure and for aldehydes by the standard bisulfite method."

The findings: "Results show that the hydrocarbon content of exhaust gases from each diesel car was less than 40 ppm during all phases of engine operation. Carbon monoxide emissions were negligible during the entire test. Chromatographic analyses of the C_3 to C_6 hydrocarbon fraction revealed only trace amounts of both paraffins and olefins." (Editor's note: olefins have been tabbed a prime irritant by smog researchers).

The report adds: "Aldehyde content of exhaust gases from the diesel cars appeared to be somewhat higher than from gasoline-powered automobiles during idle and slightly less during acceleration. However, since the bisulfite method (of testing) is subject to several interferences from other exhaust gas components, no conclusive statements can be formulated. During acceleration the diesel fuel exhaust appeared to contain less oxides of nitrogen than exhaust gases from gasoline engines. A more definitive sampling program would be required to properly evaluate the overall production of oxides of nitrogen from vehicles equipped with diesel engines."

Truesdail Laboratories' report, issued separately, said: results of these tests showed that the diesel cabs were far superior to a standard gasoline engine used as a control as far as their smog-producing potential is concerned. "The diesels produce markedly lower oxides of nitrogen concentrations in the exhaust gas and almost negligible amounts of hydrocarbons," said the report.

Equally revealing were the comparative contaminant concentrations in diesel (Mercedes and Perkins) exhausts versus contaminants found in the exhaust of the six-cylinder gasoline "control" engine. APCD researchers reported: ". . . the overall comparison must be based upon contaminant emission rates. In this regard, diesel emissions of carbon monoxide, olefins and hydrocarbons . . . are . . . substantially less than those from gasoline engines . . ."

An engine's contribution to smog is measured less by its particulate emission (smoke) than by what, chemically, constitutes the emitted products of combustion. A nearly invisible emission of olefins, for example, may be both irritating and, so believe some medical men, dangerous to health. By the same token, the so-called "smoky" exhaust may not irritate at all.

Engine guinea pigs for the Los Angeles tests were the Perkins P-4C and Mercedes-Benz 190-D. The P-4C is a 4-cylinder, 4-stroke engine with a 3½-in. bore, 5-in. stroke. It is rated 58 bhp at 3000 rpm. The 4-cylinder Mercedes-Benz 190-D has a bore of 3.346-in., 3.291-in. stroke, 115.76 cu. in. displacement and is rated 55 bhp at 4000 rpm.

Table No. 2

AVERAGE DATA FROM POPULAR 6-CYLINDER GASOLINE TEST ENGINE

Phase of Engine Operation	RPM	Equivalent MPH	CO_2 in %	CO in %	Hydrocarbon Conc. in PPM	Aldehyde Conc. in PPM	Oxides of Nitrogen Conc. in PPM
Idle	475		11.5	4.9	470	20	
Cruise	1500	35	11.9	0.9	215	55	1010
Acceleration	1600	37.5	11.8	3.2	200	25	1630
Deceleration	1500	35	6.3	4.4	5600	190	-

View shows seven of Plant A's eight 500 hp White Superior 8G-825 natural gas engines which drive injection pumps at Long Beach, Calif. Engines are equipped with Winslow oil filters (right), Fawick air clutches, Maxim silencers and Ross heat exchangers. Note individual control panel at right. Air starting is by Bendix.

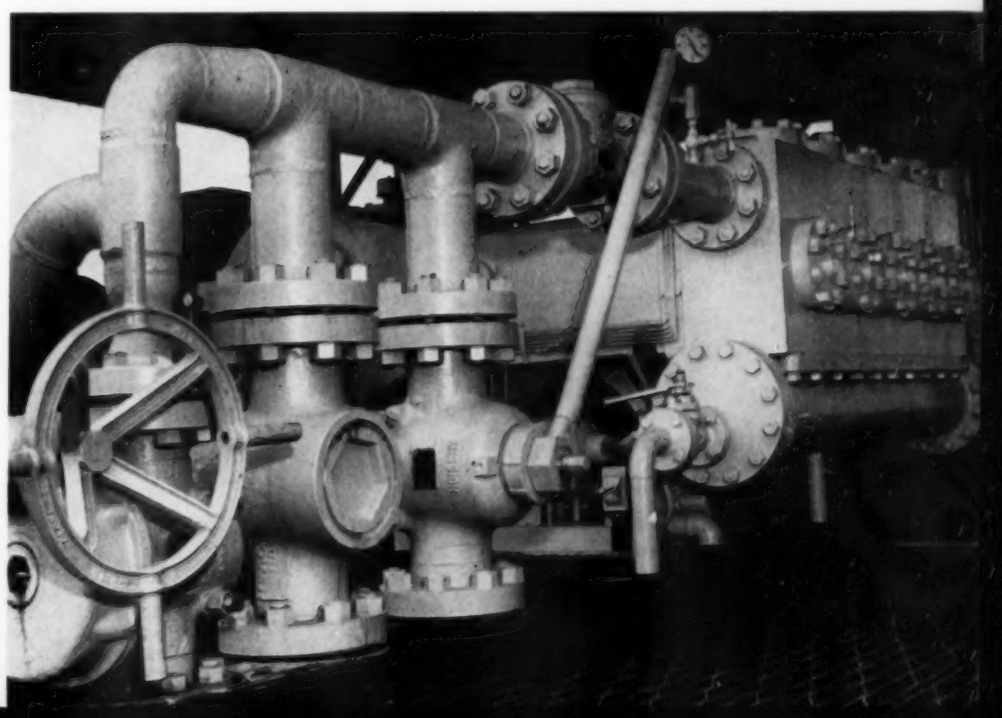
WATERFLOOD PROJECT AIM: OIL BONANZA

By JAMES JOSEPH

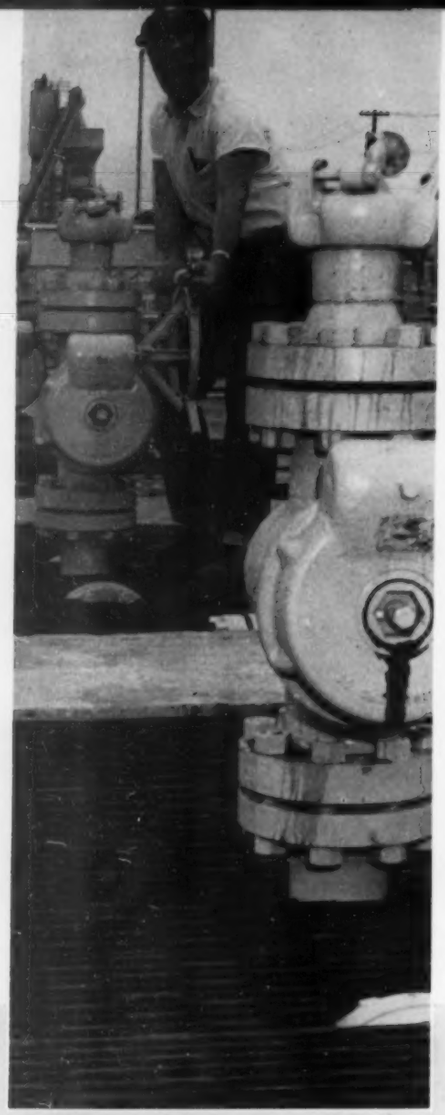
OIL and water are mixing profitably—and with promise of a petroleum bonanza—as eight 500 hp White Superior 8G-825 natural gas engines driving Oilwell horizontal quintuplex pumps begin injection of an initial 120,000 barrels/day of sea water into oil-bearing sands beneath Long Beach, Calif., in what is likely the largest waterflood repressuring project in the United States. Expected dividends from the sea water injection: a bonus "secondary recovery" of oil which until now has been largely unrecoverable as field pressures dropped. "The bonus return," one expert guessed, "may amount to billions of barrels . . . to as much oil, perhaps, as has been pumped to date in primary recovery."

Although the Wilmington field continues as a major California producer, pressures in some of its seven oil-bearing zones and more than 42 major pools have declined nearly 80 per cent over the productive years. Said an oil man: "There's every indication that waterflooding can repressure much of the field . . ." Behind this expected bonus—and the paradox of water soothing troubled seas of oil—lies a pilot operation dating back to 1953 when the Long Beach Oil Development Co., prime contractor to the City of Long Beach (which owns roughly 40 per cent of the big field) began initial waterflood operations.

The pilot plant's four Allis-Chalmers 893 natural



Oilwell horizontal quintuplex pumps are driven off 8G-825's through Lufkin 4.87:1 speed reducing gear.



gas fueled engines (150 hp at 1200 rpm), driving triplex pumps (National, Aldrich and Oilwell), began in 1953 to inject an average 14,000 barrels/day of salt water from three seawater "source" wells. Result: "A significant stimulation of pilot area oil wells." Encouraged by this pilot injection, Long Beach Oil Development Co. established a second waterflood plant. It was powered by four natural-gas fueled Waukesha VLROBU V-12 engines driving Oilwell horizontal quintuplex pumps and injecting some 71,300 b/d of salt water. Within 10 months after the plant's activation, stimulation observed at a test well was, according to one expert, "spectacular".

Backed by data which made dollars and sense, the Development Co. and a number of independent Wilmington field producers started what has become an outstanding waterflood program: 1, Recently put into operation was one of the world's largest single waterflood plants—the eight Superior-engined Pier A plant, with a 120,000 b/d initial injection capacity; 2, Scheduled for operation in August 1959 was an additional facility, four big Superior engines (8G-825's) bolstering the Waukesha-powered Pier E plant and raising its injection capacity 50,000 b/d; 3, Establishment of a fourth waterflood plant—initial operation was scheduled in July—powered by four Superior 8G-825's, with capacity of 50,000 b/d.

Engineering-wise, the field's brand-new $800,000 Pier A plant is perhaps the most interesting and looms as a model for others. Dubbed "Pier A Water Injection Plant", this waterflood station is designed straight-line: drawing from six salt water source wells with a total capacity of 200,000 b/d, the plant injects into seven wells. Ranged in the open-air pump station (sheltered only by a roof) are eight Superior 8G-825's, 500 hp at 860 rpm, with a 10 in. bore, a stroke of 10½ in. and 6597 cu. in. displacement. Equipped with Fawick air clutches, Winslow oil filters, Maxim silencers and Ross heat exchangers, the engines drive Oilwell 558 P horizontal Quintuplex plunger pumps (five of them high pressure with 4-in. plungers and three low pressure with 5-in. plungers) through Lufkin S-2712-A speed reducing gear, rated 4.87:1.

Injection pressure is automatically Fisher-regulated. Pressure depends both upon the injection wells' operational zone (depth varies to 4800 ft.) and upon their capacity, at various times, to accept more or less water. As pressure builds in a typical injection well, the Fisher regulator acts to throttle down one or more engines through their Ensign carburetors. At the same time, the regulator slows the pumping rate at the various source wells. Typical, perhaps, is source well SA-5, immediately adjacent (as are most others) to the Pier A injection plant. SA-5 draws salt water from the 400 ft. level, and has capacity of 68,409 b/d, drawn by an Armarillo right angle pump powered by a

Operator works valve of injection well, through which salt water is injected into zonal substrata.

Here is the Pier A station, which has an injection capacity of 120,000 b/d.

natural gas fueled LeRoi engine, rated 150 hp at 1760 rpm.

Salt water is pumped into one of six 3000 bbl. storage tanks. From storage, where sand is settled out, water passes by a smaller 250-bbl. tank, where chemical inhibitors are added, then to the Oilwell quintuplex pumps. Enroute, all water passes through the engines' water jackets, effectively cooling them. From the pumps, salt water is fed to a manifolding system, and finally to the injection wells. Logged by Barton recorders, injection pressures and flow-rates for the seven, during a typical recent 24-hour run, looked like this:

Injection Well	Pressure (psi)	B/D Injected
FA-104	1000	5,054
FA-105	850	22,510
FA-106	1080	30,301
FA-108	1990	561
FA-109	1980	13,577
FA-110	1965	24,749
FA-134	1990	1,997
		98,749 b/d

Of Pier A's six source wells, four rated 29,000 b/d each are tapped by submersible Reda pumps driven by 30 hp electric motors. Two, each with 60,000 b/d capacity, are served by natural gas-fueled LeRoi engines (150 hp at 1760 rpm) driving Armarillo right angle turbine pumps. The big pump station itself not only monitors each engine with an individual control panel, but houses in the operator's office a central panel that controls: 1, suction pressure to the main pumps; 2, discharge pressure both on the high pressure (2000 psi) and low pressure (1270 psi) lines; 3, operation of each of the four source wells, including stop-start switches; 4, suction pressure from storage tanks to main pumps; 5, fuel gas pressure; and 6, starting air pressure and a half dozen other operative criticals. Individual engine control panels monitor each Superior engine's lube oil pressure and temperature, jacket water temperature, starting air pressure, clutch air pressure and manifold vacuum. Visual and audible alarms are housed in the panels.

Engines are supplied fuel gas from nearby oil wells via a field-wide fuel system. Incoming at 30 psi, field gas is scrubbed in a Seco scrubber and reduced to about .5 psi for engine consumption. A Westinghouse 3YC-1 compressor supplies some 250 psi starting air from two air trucks. The plant is safeguarded against injection system failure or too high back pressure by a Fisher-regulated bypass which, in emergencies, vents both high and low pressure lines to the nearby Pacific ocean.

Currently, Long Beach Oil Development Co. is waterflooding both by the "pattern" and "peripheral" methods: 1, In peripheral flooding injection is downstream from the natural zonal oil flow. In effect, water is injected "downhill" and behind the oil front; the sea water's pressure is used to push the oil front uphill . . . toward the well. Without this piston-like action, such "secondary oil" would never reach the well to be recovered. 2, In pattern flooding injection is from four strategically placed injection wells, their flow inward toward a producing oil well located mid-center of the four. Water pressure again moves the oil front—most of it secondary—to the producing well. "In effect," said R. M. Gray, supervisor of operations for Long Beach Oil Development Co., "we're giving these oil fronts a push . . . and in the process, repressuring the entire zone."

Typically, one injection well in a peripheral flood actually pushes hitherto unrecoverable oil some 6 to 10 degrees uphill to an oil well.

One of the injection pumps is inspected by (from left): Warren Johnson, Standard Oil Co. of California; Joe Bishop, president of Long Beach Harbor Commission; Frank J. Hardesty, chief petroleum engineer for the Long Beach Harbor Dept.; and Charles L. Vickers, port manager.

Operational control board monitors plant, its injection and source wells, manifolding and all flows and pressures.

Pier A Injection Plant Equipment List

Engines	White
Pumps	Oilwell
Reduction gear	Lufkin
Clutch (air)	Fawick
Oil filter	Winslow
Silencer	Maxim
Air cleaner	Vortox
Governor	Fisher
Carburetor	Ensign
Gauges	American, Ashcroft, Weston, White, JBT
Unit control panels	White
Engine coupling	Falk Steelflex

Four-wheel drive Hough H-90 with log, lumber grabs on the chassis dynamometer. This "Payloader" is available with either GM or Cummins diesel and Allison six-speed transmission.

Road horsepower and speed tests at full load are conducted for HU Payloader with Hercules diesel.

DYNAMOMETER PROVIDES "OUNCE OF PREVENTION"

The Frank G. Hough Co. Markedly Cuts Field Service Costs and Builds Customer Good Will by Shop Dynamometer Testing All Engine-Driven Material Handling Equipment

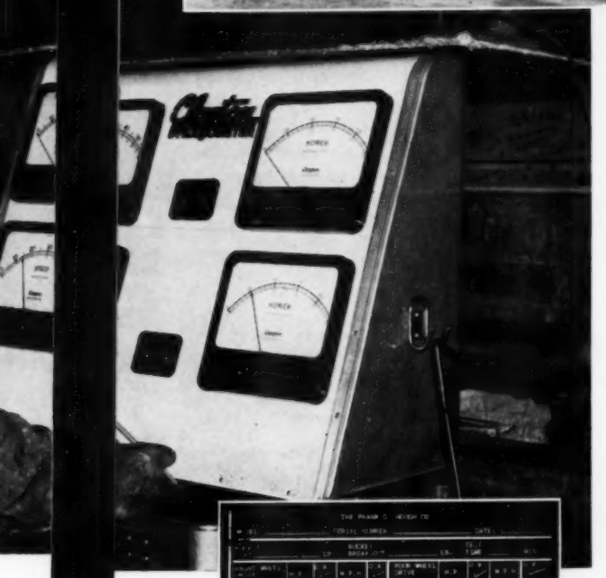
By ROBERT E. SCHULZ

LIBERTYVILLE, ILL.—An 80 to 90 per cent reduction in pre-delivery service adjustments by distributors and potential field service problems is almost an unbelievable record, yet that's exactly what The Frank G. Hough Co. has achieved through installation of a heavy-duty chassis dynamometer for shop testing its full line of diesel and gasoline powered "Payloader" tractor-shovels and "Paymover" towing tractors. Located in this suburban city on Chicago's northwest side, Hough manufactures a broad range of material handling equipment widely used in construction, mining, aggregate production, foundries and steel mills, chemical and fertilizer plants, public works, etc. The equipment is ruggedly built to measure up to field service demands which, in many cases, means working 24 hours around the clock.

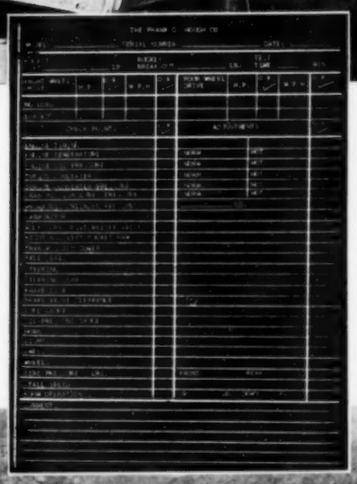
With an expanding product line and increased production, particularly in recent years, Hough officials found field service costs zooming as well. Final inspection procedures and tests had been well established and followed in the plant; however, these did not always disclose when parts adjustment or replacement was required, and this showed up promptly when the equipment entered service. Thus, Hough decided on the "ounce of prevention" theory and in July 1958 put its first unit through a simulated field test in the Libertyville plant. The test facility selected for this underload quality control inspection consists of two Clayton C-250 heavy duty truck chassis dynamometers, installed together, to provide a dual machine capable of handling all Hough models, including those with four-wheel drive. The dynamometer testing program, now completing its first year, has been especially successful and today all Hough engine-driven equipment must pass the test before being sent out into service. According to Manager of Manufacturing Frank E. Hoeller, the program has reduced the potential new equipment field service calls 80 to 90 percent; while dollar figures are not available, he knows that the savings are substantial, to say nothing of the increased customer good will.

In regular manufacturing procedure, all "Payloaders" and "Paymover" machines come off the assembly floor to the final inspection department. After each piece of equipment completes this inspection phase, it is driven to the outdoor test strip where it is run for 30 minutes in high gear at one-half throttle. It then moves into the dynamometer testing area, immediately adjacent to the final inspection department and, as soon as space is available, onto the testing rolls. Dynamometer testing here is a three-man operation. The chief operator has the responsibility of supervising the tests and recording data. The other two operators alternate moving machines to the outside strip and back to the dynamometer for testing. Let's take a look at a test on a model HU "Payloader" that was conducted during my visit. The HU is a four-wheel drive tractor-shovel with a carrying capacity of 5000 lbs., a lifting capacity of 8000 lbs.

HU "Payloader" on the test strip at Hough's Libertyville plant during 30-minute warmup period preceding dynamometer tesitng. The HU is driven by a Hercules diesel with 84 max. hp at governed speed.



and a breakout force of 13,000 lbs. This particular model was powered by a Hercules DIX-6-272 diesel rated 84 max. hp at 2200 rpm governed speed and equipped with a single-stage, two-phase torque converter and full six-speed power-shift transmission of Hough design and manufacture. The HU is also available with the new International Harvester UD-282 diesel. After warming up for 30 minutes to bring pressures and temperatures to normal operating level, the unit was backed up on the rolls. In the first testing phase, running in high gear, front wheels only at full throttle to check for top speed at no load, it recorded 22 mph. In the next phase, the unit was checked for road speed and horsepower. Load on the Clayton dynamometer is imposed through the rollers by a closed hydraulic power absorption system. Speed and torque measurements are electrically integrated, permitting horsepower readings to be shown directly on a large meter without computations. A matching electric meter shows road speeds in mph regardless of tire size or rear axle ratio. The load is easily controlled or changed at will by pressing one of two buttons located on a remote control in the hands of the operator. With the portability of the control, the operator can move around the equipment in the test area and, if required, can carry it inside the test vehicle.



Clayton dynamometer test report such as this is completed on each piece of Hough equipment.

H-120 "Payloader" working in the Pennsylvania coal fields is powered by Cummins NRT-6-BI turbocharged 300-hp diesel with eight-speed transmission. Dry-type air cleaner is Donaldson.

After the front wheel drive test sequence was completed, the driver placed the "Payloader" in four-wheel drive and the two tests repeated. Following these tests, the other points shown on the illustrated dynamometer report were carefully checked and recorded. Reports of this type are made out for every piece of equipment and routed to Hoeller's office, where they are condensed and duplicated. In this way it is relatively easy to pin point spots where assembly procedures must be changed as well as detect supplier items that are not meeting manufacturing standards.

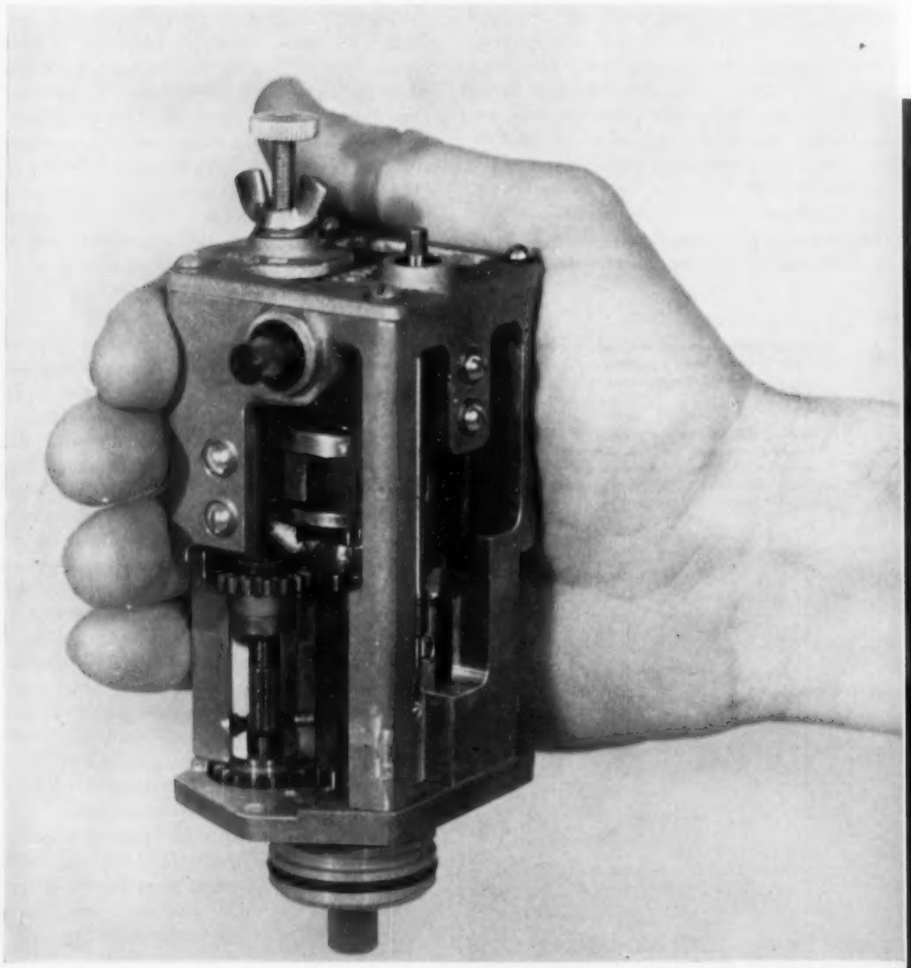
The fact that 80 to 90 per cent of the equipment is given additional adjustment and extra attention is indicative of the thoroughness of the testing program. In reviewing the reports with Hoeller, here are some of the items revealed through this test program on the diesel equipment: torque converter temperature too high; engine oil filter leaked; output shaft seal leaked; engine horsepower too low; converter pressure low; accessory relief valve leaked; engine temperature gauge not functioning; brake cylinder leaked; hose leaked on valve in reservoir; pinion shaft oil seal poor; sand holes in casting (determined through use of black light); timing off with rough running engine. In commenting on the above, Hoeller stated that while most of the problems are minor and can be readily corrected in the plant, they would require a service call in the field involving expense by the distributor service department on one hand and lost time by the operator on the other. These are good reasons why Hoeller, as well as sales and engineering officials at Hough, are enthused with the dynamometer program. Signs posted strategically around the plant aptly say, "Our Chassis Dynamometer Is Worth A Thousand Opinions."

COMPACT HYDRAULIC GOVERNOR FOR HIGH SPEED DIESELS

Curtiss-Wright Model LE, Developed for Regulation of Smaller Engine Generator Sets, Is 2 in. Square By 4 in. High and Weighs 3½ Lbs.

A HIGHLY interesting new, very small hydraulic isochronous governor has been announced by Curtiss-Wright Marquette Division, Cleveland, Ohio. This governor, designated the Model LE, has been developed for regulation of smaller high speed engine generator sets. It features a unique design which will be described in detail here with a schematic drawing. The operation and performance capabilities also merit close examination and will be included in the detailed description.

The governor is very compact, measuring 2 in. square by 4 in. high, and weighs only 3½ lbs. It meets the military specifications on transients, steady state and recovery time, runs horizontally or can be vertical if specified. The unit can have its own pump and sump, which gives oil pressure at once because of short lines and no air in the system—important on automatic starting. This design assures a closed oil system to maintain oil at clean level; having its own pump allows for sizeable work capacity of 20 lbs./in. maximum torque on terminal shaft. The governor has interchangeable mountings for magneto flange, Army-Navy flange, and flange to interchange with some other commercial types of governors. The governor is spring loaded in fuel off direction, so if oil pressure fails it shuts the engine down. An aluminum case dissipates heat rapidly, keeping running temperature of the governor down. The unit can be temperature compensated and has an easy-to-change proportioner spring, which makes governor stopping action match various engine fuel control linkage arrangements. Speed Droop, externally adjustable, can be provided when specified and a synchronizing motor can also be furnished. This governor can be mounted on the end of a Bosch fuel pump. On very small engines requiring up to 2 in./lbs. work capacity, the pump and sump can be omitted if clean engine lube oil at over 40 psi is available. The governor is rated to run at constant speed of from 1800 to 3600 rpm and the speed adjusting range for variable speed service is 4 to 1. A description of the design and operation of the LE governor is as follows with reference



Curtiss-Wright LE-80 hydraulic isochronous governor cutaway section showing the unique relative rotation of proportioner cylinder, which also drives the ball head. This is about the actual size of the governor.

to the schematic drawing which appears on this page in the last two columns.

Shaft 1 is driven by the engine and carries gear 2, which with gear 3 is the self-contained pump in this small, compact governor. Gear 3 drives transfer shaft 25, having gear 4 at its upper end to drive gear 5 carrying the flyweights 7 and 8. As the flyweights move outward their toes raise pilot valve 11 against the pressure of speeder spring 10. Pilot valve 11 rotates with the flyweights inside of stationary hardened sleeve 6, to provide the feature of relative rotation to reduce friction to a minimum. Discharge pressure oil 14 from the pump passes through the center of the pilot valve and on to push upward at all times on constant pressure power piston 15, which attached to short lever arm 17 on the governor output terminal shaft 21. A larger regulating power piston 18 is also connected to terminal shaft 21 by a longer crank arm 20. When land 12 of the pilot valve is at center, oil is locked under regulating piston 18 and there is no movement of the terminal shaft.

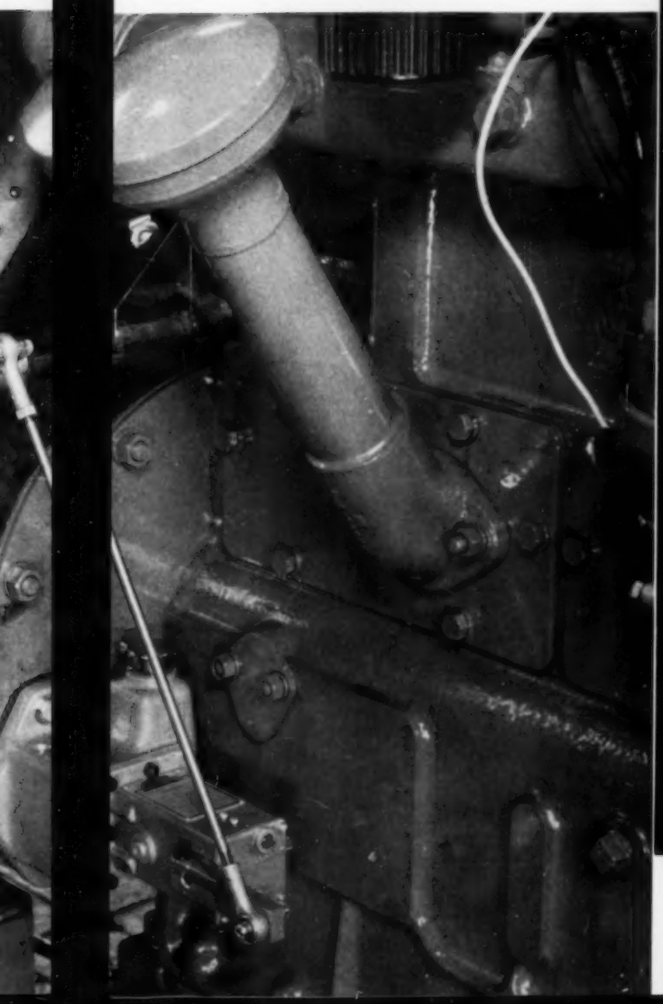
If the weights move inward and lower the pilot, land 12 allows pressure oil 14 to act upwardly on regulating piston 18, which overpowers the constant pressure piston 15, because it is larger and has a longer lever arm, and moves the terminal shaft toward a full load. If the weights move outward and raise the pilot valve, land 12 releases oil from piston 18 to sump 30 and the constant pressure piston 15 accordingly pushes the terminal shaft toward no-load. This attains a differential power system with small diameters for compactness, and has the advantage of constantly keeping the governor free from internal slack.

Stopping action of the fuel adjustment at the right point is accomplished by a compensation system with a proportioner. Crank 22 on the terminal shaft moves balance piston 24. A passage from 24 leads to chamber 28 under plunger 13 on the bottom of the pilot valve. Then it leads on to a space under proportioner piston 31, which is supported by push-pull spring 26 suspended from bracket 27. It should be noted that piston 31 is in a bore of the turning transfer shaft 25, which gives a compact construction and provides a relative rotation to practically eliminate friction. The compensation system can breathe back and forth to sump through needle valve orifice 29.

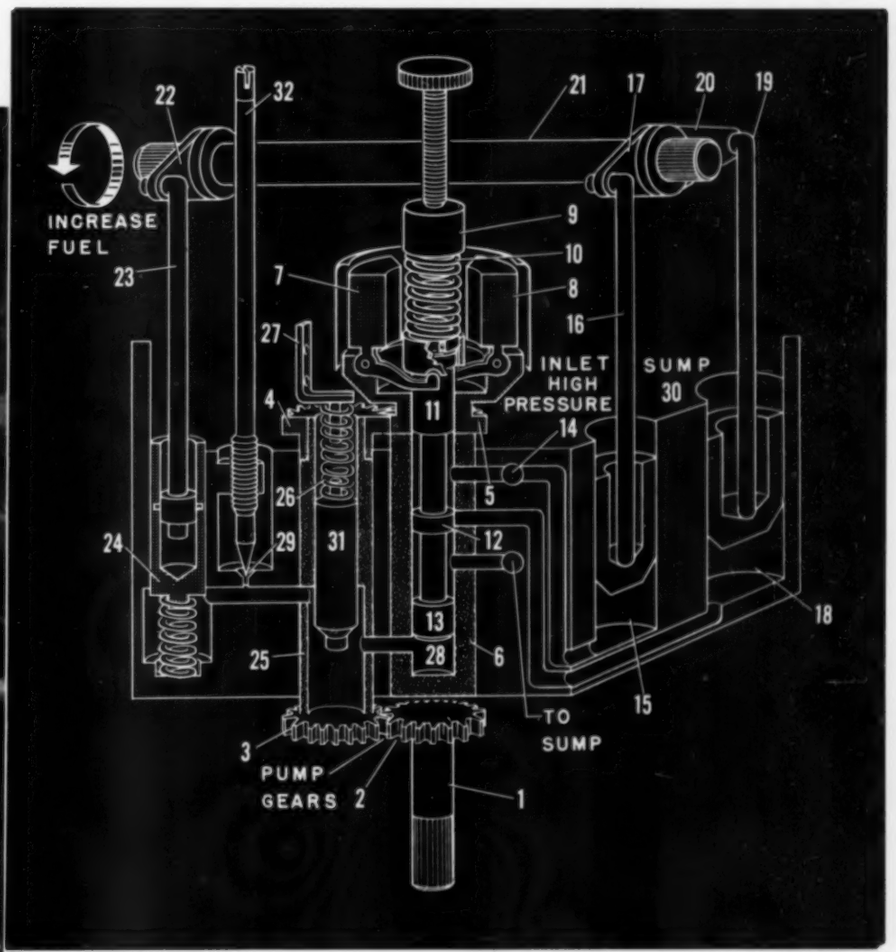
In the position shown, the pilot valve is at center with the engine at some constant load. If a load is thrown on, the weights move inward and lower the pilot valve so that land 12 lets pressure oil under regulating piston 18 to move the terminal shaft toward full load. To stop the terminal shaft at the right place, balance piston 24 moves downward, displacing compensation oil to the point of least resistance, which is the proportioner piston 31, just floating on its spring. Compensation oil, therefore, pushes proportioner piston 31 up until its spring resists with a force equal to the downward off-speed force on the pilot valve. At this point the compensation system is in force balance, so that as balance piston 24 moves farther, it hydraulically pushes the pilot valve back up until it hits center again to stop the power piston.

Then the pilot is at center where it was, the terminal shaft is stopped at an increased fuel position, and the proportioner piston is up off center. The proportioner piston gets back to center by bleeding oil out of the needle valve orifice 29. As it does this, its spring holds a gradually diminishing hydraulic force up against the pilot valve to keep it from opening again as the engine comes back to speed. The time the proportioner piston takes to come back to center is matched to the ability of the engine to come back to speed by adjustment of the needle valve. This provides a relatively simple "force balance" hydraulic compensation so that the governor can move fast to a new position and stop with stability, Curtiss-Wright reports.

Curtiss-Wright LE-80 hydraulic isochronous governor with its own oil sump and pump mounted on a 37½ kva engine generator unit built by Duplex Truck Division of Warner and Swasey Co., using the Continental R602 engine.



Schematic drawing of the model LE hydraulic isochronous governor.



SIREN FOG SIGNAL POWERED BY DIESELS

New Offshore Warning Unit Has Sound Output of 125 Decibels: Twin 6½ HP Engines Supply Main and Standby Drive

By DOUGLAS SHEARING

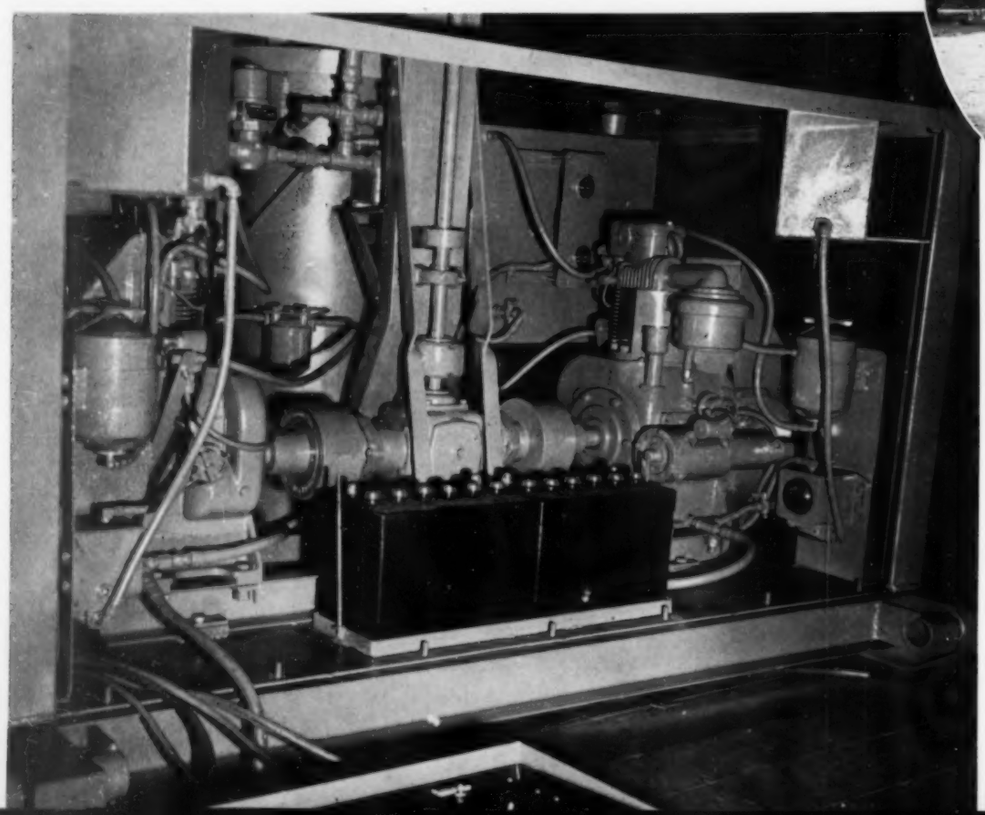
A NEW siren-type fog signal powered by twin 6½ bhp American Marc diesel engines has been developed by Tideland Speciality Co. for offshore platform application. Designated model DS-2, the new unit, according to its manufacturer, produces the greatest sound output for the smallest power input ever recorded for a fog signal. This development by Tideland comes as a result of the solution of several problems involved in the use of sirens as fog signals, chiefly that of producing a sound of constant pitch to conform with certain regulations.

Tideland has adapted a Federal Siren and Signal Corp. model STH-10 to marine fog signal use. The siren is known as one of the most efficient sound producing devices available, but the characteristic siren noise is a wailing note of varying pitch. The siren sound in the Tideland DS-2 is produced by rotating one ported member (the rotor) within a similarly ported stationary member (the stator). The rotor combines the functions of a rotary pump and a chopper. Alternate cutting and releasing of the air flow produces sound waves. The pitch of the siren is a factor of the number of port openings and the rpm at which the rotor is driven. The problem of attaining a constant pitch in a siren was solved through the use of an hydraulic cylinder to lift periodically the seven-ported rotor spinning at 2800 rpm from the "dead chamber" (stator well) into the seven-ported chamber (stator). This immediately produces a note of constant pitch, 325 cycles per second and a maximum sound output of 125 decibels, or an audibility range well in excess of two miles. At the end of a two second period the rotor is lowered into the stator well and the sound is stopped.

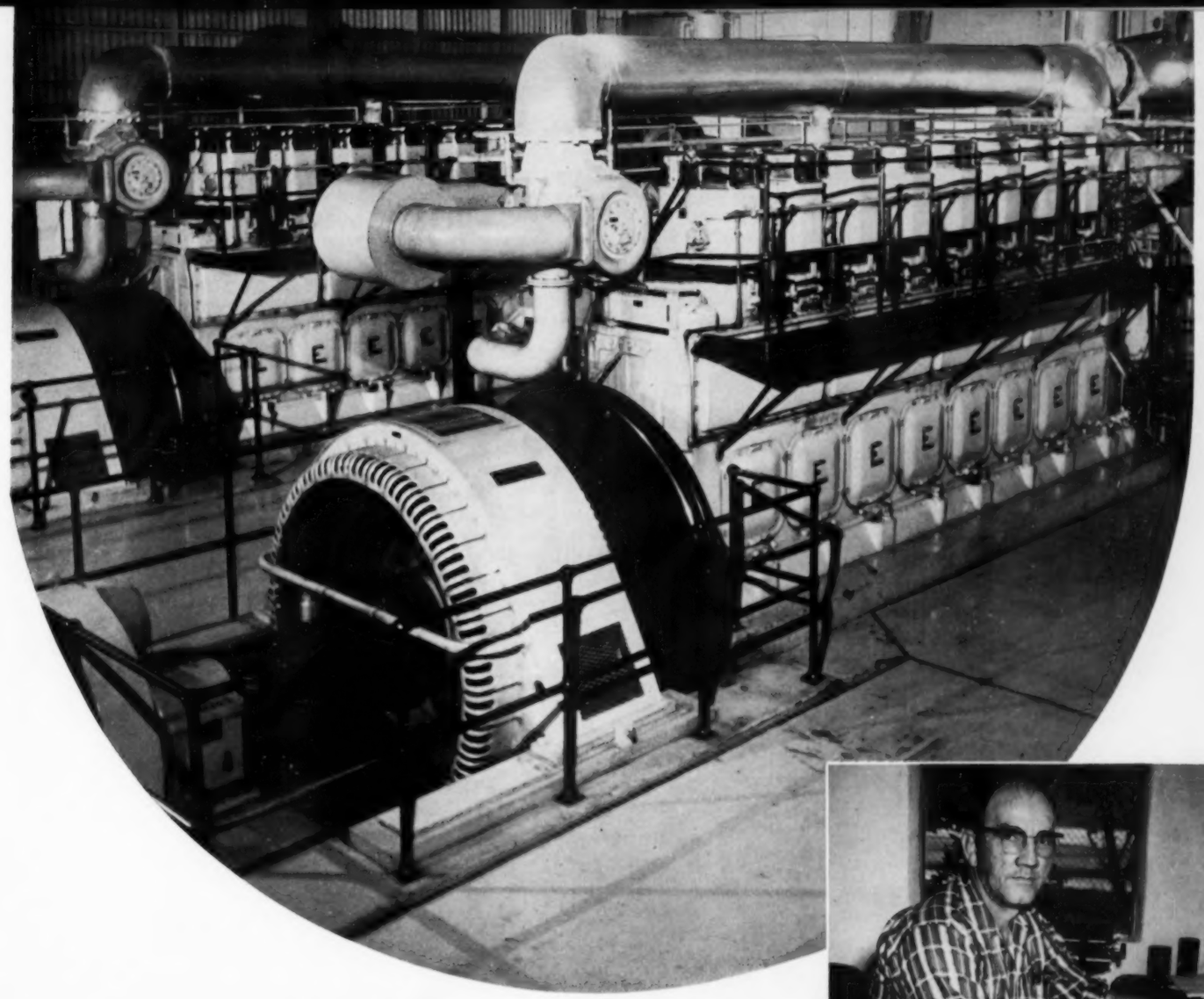
Basic components of the DS-2 system include two American Marc air cooled, one-cylinder diesel engines as prime movers. These engines are rated at 6½ shaft bhp and are set to operate at 1800 rpm. These are four-cycle engines with a 3½ in. bore, 3⅝ in. stroke, piston displacement of 34.8 cu. in. and compression ratio of 20:1. Only one of the diesels is used during operation; the other is on standby. In event of failure, the standby is automatically started and continues to operate the unit. Through a compound arrangement, each diesel drives into a single Denison hydraulic pump. This pump in turn operates an hydraulic motor that turns the rotor at 2800 rpm. The rotor is moved axially upward by means of an hydraulic cylinder, pressure for which is furnished by the pump. The complete unit requires only 28 sq. ft. of deck space; total weight without fuel is 3700 lbs. Total weight with fuel for 45 days continuous operation, hydraulic fluid and lube oil is 7087 lbs. Tideland engineered the DS-2 for disassembly at dockside and reassembly on platform, permitting transportation of a regular crew boat. Because of the relative simplicity of the unit, it is anticipated that maintenance costs will be minimal.

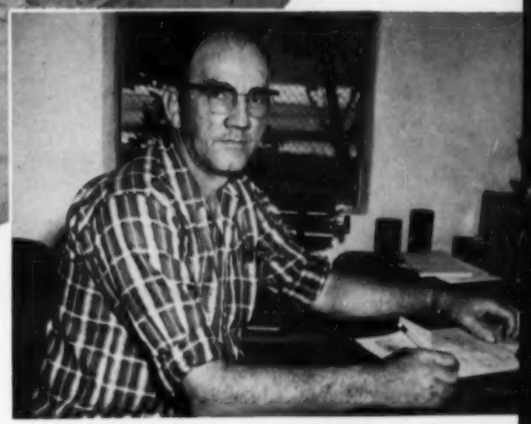
The Tideland DS-2 was tested in an anechoic chamber in the presence of U.S. Coast Guard officials. Sound output was measured and recorded in decibels. U.S. Coast Guard curves require a minimum of 116 decibels at 325 cycles. Test results of the DS-2 siren indicated a sound output of 124 decibels measured at 10 feet, and at a frequency of 305 cycles per second with an operating speed of 2610 rpm. A frequency analysis showed no important harmonics. Tests conducted at the actual operating speed of the DS-2 of 2800 rpm showed 125 decibels measured at 25 feet—9 decibels in excess of Coast Guard requirements.

Overall view of the Tidelands Signal ready for shipment for offshore operation.



Unit showing compound drive arrangement of American Marc 6½ hp diesels.





HEAVY FUEL BOOSTS PROFITS AT NEW SMYRNA BEACH

Two 1800 KW Enterprise Diesels Operating in Florida Municipal Plant Save $49,400 in Year; Average 14.7 KWH/Gal. on Bunker "C" Fuel.

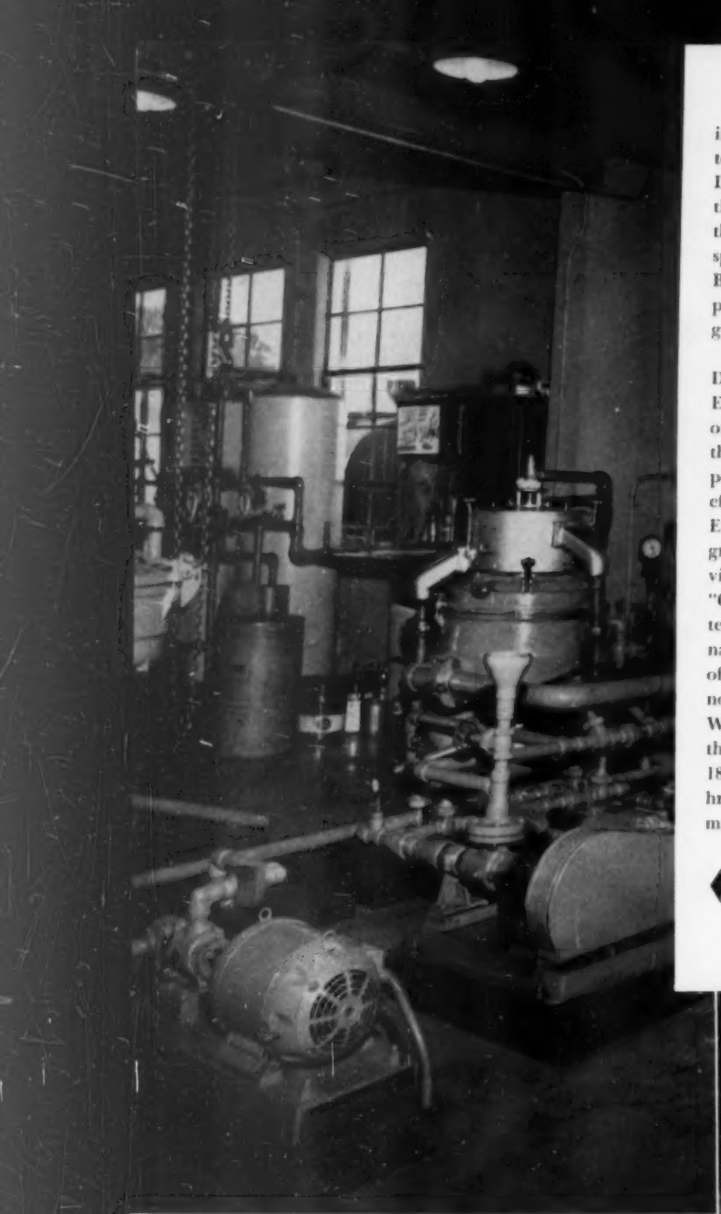
By KEN R. MACDONALD

Two Enterprise DSR 38 diesel engines turning 1800 kw Elliott generators in the New Smyrna Beach plant. Note dual Brown-Boveri turbocharger arrangement with Kittell silencers. Engines are served by Woodward governors and Bendix-Scintilla fuel injection equipment.

Because of New Smyrna's success with heavy fuel, other plant operators in the Florida area are now consulting with Chief Engineer Robert L. Whitesides to gain the benefit of his experience.

REDUCTIONS in cost for the customer and a "better break" for the taxpayer have been fairly common results of municipal power plant operation among most small United States communities. The use of diesel engines equipped to burn residual or low-grade fuels, has added to these advantages of lowered rates and reduced tax supports, the benefits of substantial cash profits to be made by municipally owned utility systems. With less than 6,000 customers, the $6,500,000 New Smyrna Beach, Fla., electric utility system has just such a low-cost-plus-profits type operation as its 1957-1958 profit statement clearly shows. With 75½ per cent of its plant output generated by two 2500 hp DSR-38 turbocharged diesels, made and installed by the Enterprise Engine & Machinery Co., the New Smyrna Beach utility turned in a net profit of $147,258.87. "Our average sale," explains Mr. Robert L. Whitesides Jr., power plant superintendent, "represented 2.09 cents per kwh, as compared with a gross cost per kwh of 1.09 cents, thus netting the city an average profit of one cent per kwh while at the same time saving tax dollars and offering customers efficient and economical service."

Whitesides credits a substantial part of the "efficient and economical" operation at New Smyrna Beach to the fact that the utility plant's two new Enterprise diesels are able to burn Bunker "C" or ASTM No. 6 residual fuel. "This is considered to be the poorest of all the heavy fuels used for diesel engines," Whitesides explains, "but because



Heavy fuel preparation equipment in the New Smyrna Beach plant includes these two DeLaval centrifuges and DeLaval IMO fuel pumps.

we have been able to use it in the Enterprise engins, the two larger of our six diesels, we've been able to save as much as $4,000 or more a month on our fuel costs alone."

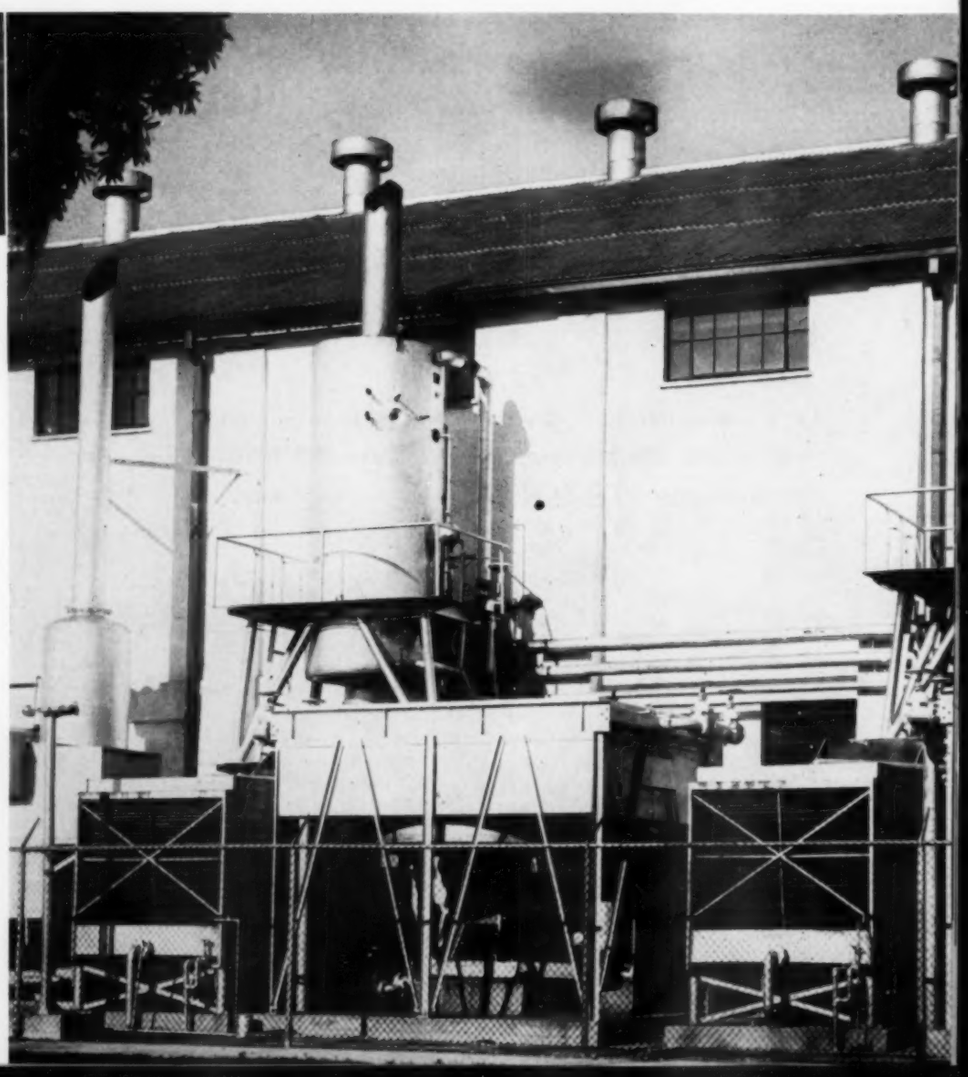
The two Enterprise engines, each of which is rated 1800 kw at 360 rpm, 145 psi bmep, represent 48 per cent of the installed capacity of the New Smyrna Beach utilities plant. They have been in almost constant operation since Jan. 1, 1957, and have burned more than 2,500,000 gals. of the heavy fuel, at a gross savings of approximately $62,900 for both engines. The New Smyrna Beach utilities plant also is served by three 1000 kw diesel units and one 840 kw diesel. These four diesels operate on more expensive No. 2 grade distillate fuel and, although they represent 52 per cent of the installed capacity, generate only 24½ per cent of the plant output of saleable power.

During the calendar year 1958, the two Enterprise engines burned 1,211,079 gals. of the Bunker "C" fuel, which is 4.08 cents a gal. cheaper than the No. 2 grade fuel. The other four diesels used 516,678 gals. of the latter. "It becomes a simple matter of arithmetic," Whitesides explains, "to establish the fact that our fuel savings through installation of the Enterprise engines, amounted to $49,400 during the period from Jan. 1 through Dec. 31, 1958." Inasmuch as the Btu content of the cheaper oil is 10.1 per cent higher than that of the more expensive distillate fuel, and because the specific fuel consumption is directly related to the Btu content, both Enterprise engines used 10.1 per cent less fuel on a volume basis than the engines using distillate fuel.

During 1958, operating records reveal, the two Enterprise engines averaged 14.774 kwh per gal. of the cheaper, almost "sludge" type fuel, while the other four diesels averaged only 11.573 kwh per gal. on the high grade oil. "This means, in effect," Whitesides points out, "that both of the Enterprise engines actually produced $62,900 in gross savings for New Smyrna Beach simply by virtue of their ability to burn the cheaper Bunker "C" fuel." Additional savings for the utilities system have resulted from the confinement of maintenance costs to fuel pump re-work and replacement of the heavy fuel filter elements and injection nozzles. "These costs have been remarkably low," Whitesides said, "in view of the fact that one of the Enterprise engines has accumulated more than 18,000 hrs. of use and the second more than 25,000 hrs. During heavy frosts several years ago the demand for power became so great that it was necessary to operate the Enterprise engines at 2200 kw for extended periods of time." This corresponds to 170 bmep, compared to the nameplate rating of 145 bmep. One of the engines also has been subjected to a momentary overload of 2500 kw, which corresponds to more than 200 bmep!

During June of 1959 one engine was taken off the line and inspected after 25,000 hrs. operation to determine the effects of Bunker "C" fuel on wear rates. The maximum cylinder liner wear was only 0.001 in. Maximum piston wear was found to be 0.002 in. Piston rings were in excellent condition and still within drawing tolerances. The only work required was regrinding valve seats and the replacement of some exhaust valves. Considering the length of service burning Bunker "C" fuel, this is considered quite acceptable. This inspection confirms the belief that heavy fuels, properly treated, can be successfully burned with very minor maintenance costs. Maintenance costs, including operational costs, directly chargeable to the heavy oil operation, in 1958 totaled only $9,202. Therefore, the net savings to New Smyrna Beach for both DSR-38 engines amounted to $53,-698 for 1958.

"The Bunker 'C' fuel," Whitesides explains, "cost .0699 per gal. as contrasted with the .1107 a gal.



Maxim exhaust silencers for the Enterprise engines incorporate waste heat boilers for heating the Bunker "C" fuel. Young jacket water cooling towers and Air-Maze intake air filters are in foreground.

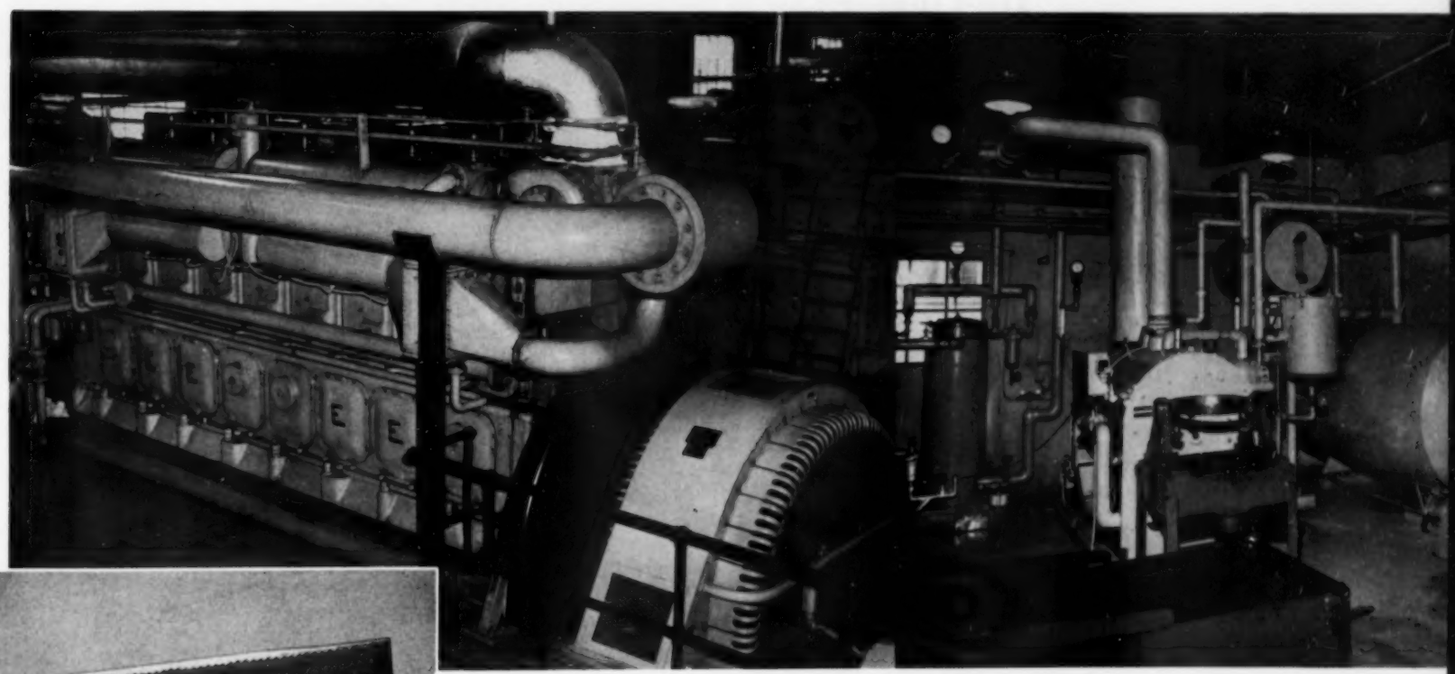
paid for the higher-grade No. 2 fuel. During 1957, Enterprise engine No. 6 produced 7,471,500 kwh, operating 6144 hrs. and 15 min. The Enterprise No. 7 engine, 1957, produced 8,489,100 kwh, operating 7012 hrs. and 35 min. and both consumed 761,927 gals. of the Bunker 'C' oil." "Last year," he went on, "engine No. 6 produced 8,383,000 kwh, operating 6815 hrs. and 15 min. and the No. 7 engine produced 9,509,500 kwh, operating for 7484 hrs. and 25 min. Both engines used 1,211,079 gallons of Bunker 'C' oil. By April of this year both of these Enterprise engines had burned more than 2,500,000 gals. of the low-grade fuel and we estimate that the earnings based on a 20 year period of one of these engines alone, No. 7, which cost us $400,000 installed, will approximate $656,955."

The following tabulation lists a typical residual fuel oil analysis made a year ago, corresponding to the Pure Oil Company's code 2046:

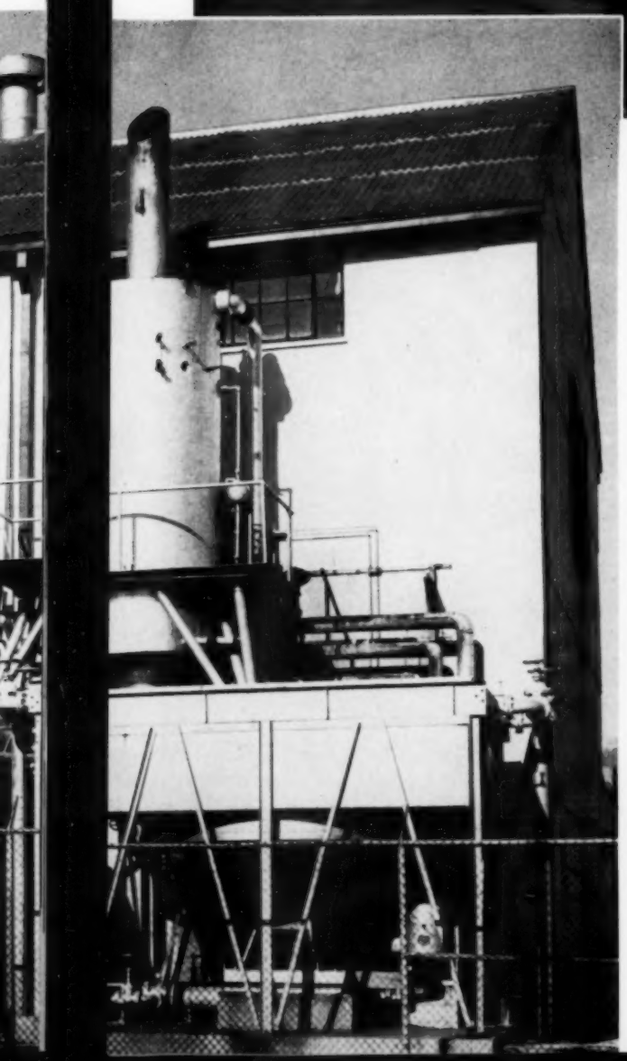
	Analysis	Control Analysis
Gravity API	11.4	13 max
Sulfur, Wt %	1.04	1.6 max
PM flash F	270	150 min
Furol Vis. at 122° F (SFS)	109.0	200 max
Sediment Wt %	0.02	.25
B.S. & W. Vol. %	0.4	1.0 max
Pour F	30 Plus	
Ash, Wt %	0.025	
Carbon	—	
Hydrogen Wt %	—	
Nitrogen Wt %	—	
Oxygen Wt %	—	
Water, Vol %	—	
Btu/gal. (Gross)	155,000	152,500 min

Inasmuch as maintenance costs can be a major item for municipally operated utility systems, Whitesides reviewed for DIESEL PROGRESS the New Smyrna Beach maintenance experience with the heavy fuel burning diesels.

Per Year	Item
$ 210	Fuel filter elements must be replaced each 90 to 120 days, at a cost of $61.11 for each complete replacement.
$ 62	The engine mounted filter element must be replaced 20 times a year
$7,240	At a cost of .0241 cents per kwh, auxiliary power equipment, such as centrifuge, heaters, special fuel pumps, etc., approximate this sum
$1,690	Replacement three times a year of nozzles. This cost would approximate $500 with the burning of a good grade fuel, such as No. 2 oil
$9,202	As compared with gross fuel savings of $62,900 resulting from the use of the low-grade Bunker "C" oil.



One of two Enterprise DSR 38 engines, each rated 1800 kw at 360 rpm, that produce 75 per cent of the plants electrical output; units are equipped with dual Brown-Boveri turbochargers for improved scavenging.



Heavy fuel preparation equipment includes from left, Winslow fuel oil filter, boiler and heavy fuel day tank.

List of Principal Equipment Serving Enterprise Engines

Generators	Elliott
Water cooling towers	Marley
Air cleaners	Air-Maze
Jacket water pump	Gould
Intake silencer	Kittell
Fuel oil filters	Winslow
Lube oil filters	Winslow
Silencer	Maxim
Heat exchangers	Young
Centrifuge	DeLaval
Primary fuel pump	DeLaval IMO
Primary fuel heater	Griscom-Russell
Turbochargers	Brown-Boveri
Governors	Woodward
Pyrometers	Alnor

CLARK'S TWO-CYCLE V-TYPE GAS ENGINE

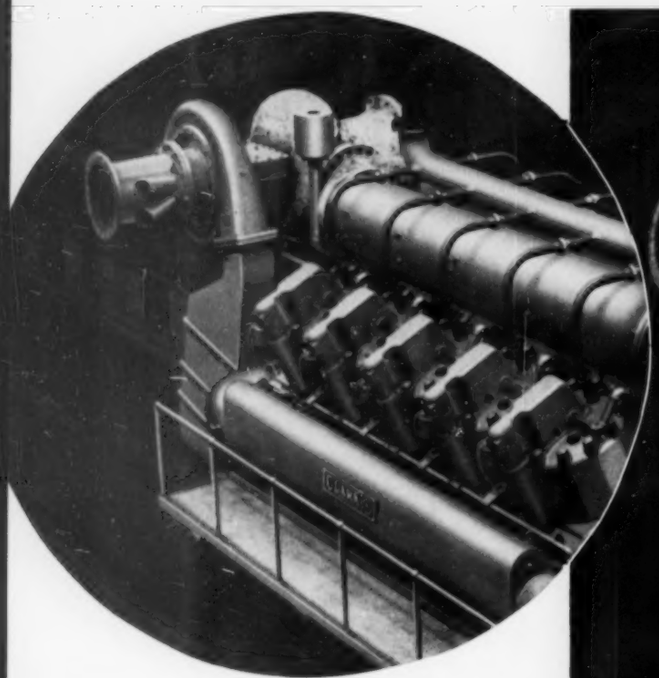
New Prime Mover Available in 4000-6400 hp Range for Centrifugal Compressor, Generator and Pump Drive; Columbia-Gulf to Install Ten-Cylinder Unit in Remote Controlled Station

CLARK Bros. Co. has announced the introduction of a V-Type, turbocharged, two-cycle gas engine. Designated the model TPV, it is designed as a compact, high horsepower driver for centrifugal compressors in pipeline booster stations, for power generation and for pump drive. With a 17 in. x 19 in. bore and stroke, the engine will be built in three sizes—10, 12, and 16 power cylinders—rated at 4000, 4800, and 6400 bhp respectively at 330 rpm.

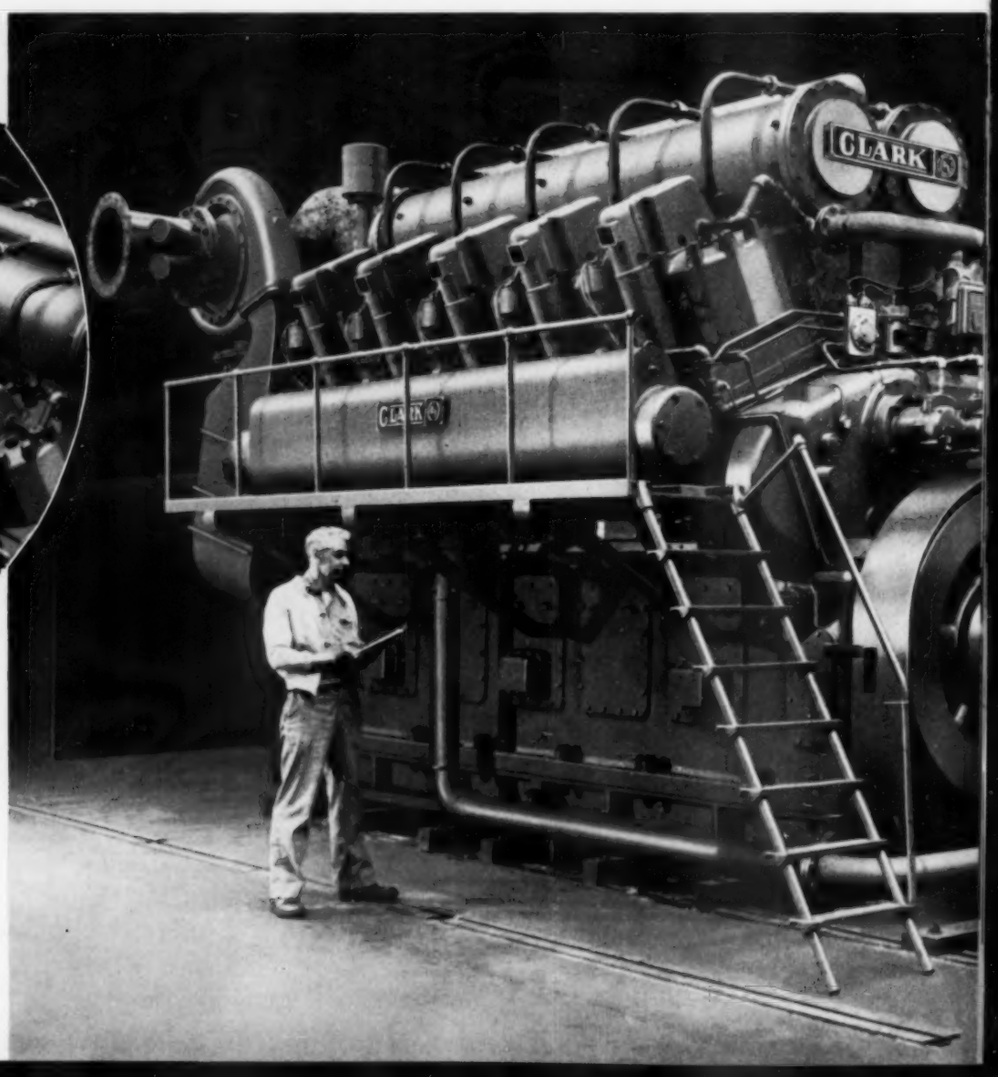
Several years in development, the new V-engine will operate at approximately 40 per cent thermal efficiency. It incorporates many major design features of the Clark model TLA integral gas-engine-driven compressor. Bmep rating is a conservative 110 psi, resulting in low stress, long component life, high reliability and an ample reserve capacity.

The TPV is equipped with a jet air started turbocharger of Clark design. At normal operating conditions, it is completely self-sustaining and imposes no parasitic load on the engine. Throughout the entire operating range, turbocharger speed is automatically matched to the engine and requires no attention from the operator. The turbocharger and intercooler, normally mounted on the engine, can also be installed on the roof of the station if installation requirements deem this practical.

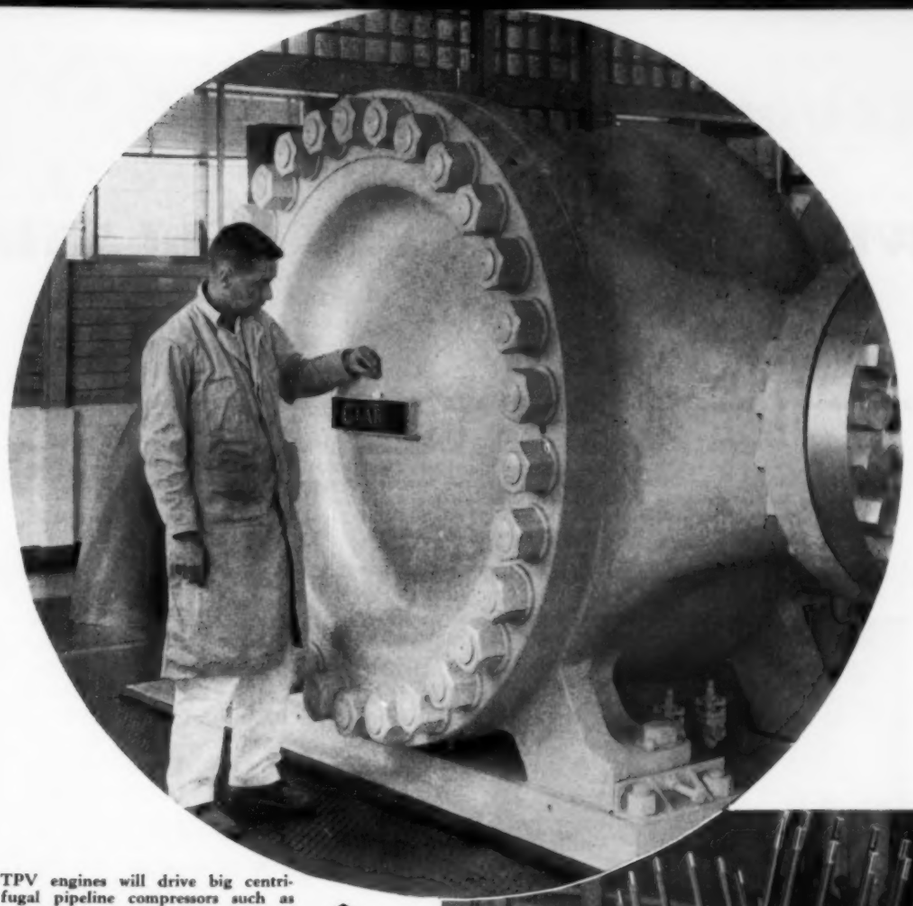
The cylinder block is a heavily ribbed, one piece casting of semi-steel to insure maximum rigidity and permanent alignment of the power cylinders. Power pistons are the two-piece, oil cooled type. Water cooled, power cylinder liners in the block carry no tension loading of the power cylinder heads, hence are free to expand as the engine comes up to operating temperature. The lower crankcase is cast of fine grained semi-steel with precision-bored, integral main bearing supports. A three piece articulated connecting rod assembly permits the use of a heavy pin, reduces rotating weight, provides balanced load distribution, and achieves maximum crankpin bearing area. The assembly includes a master rod with cap carrying a link rod with an oscillating pin. The crankshaft is an extra-heavy, one-piece steel forging, precision machined throughout. Shaft diameter is 15½ ins. Because of thorough Clark engineering, the TPV engine-gear-compressor train can be operated throughout the normal 250-360 rpm speed range



Jet air started turbocharger and intercooler are normally mounted on engine of model TPV.



Here is a closeup of a 10 cylinder model TPV gas engine, rated 4000 bhp at 330 rpm.

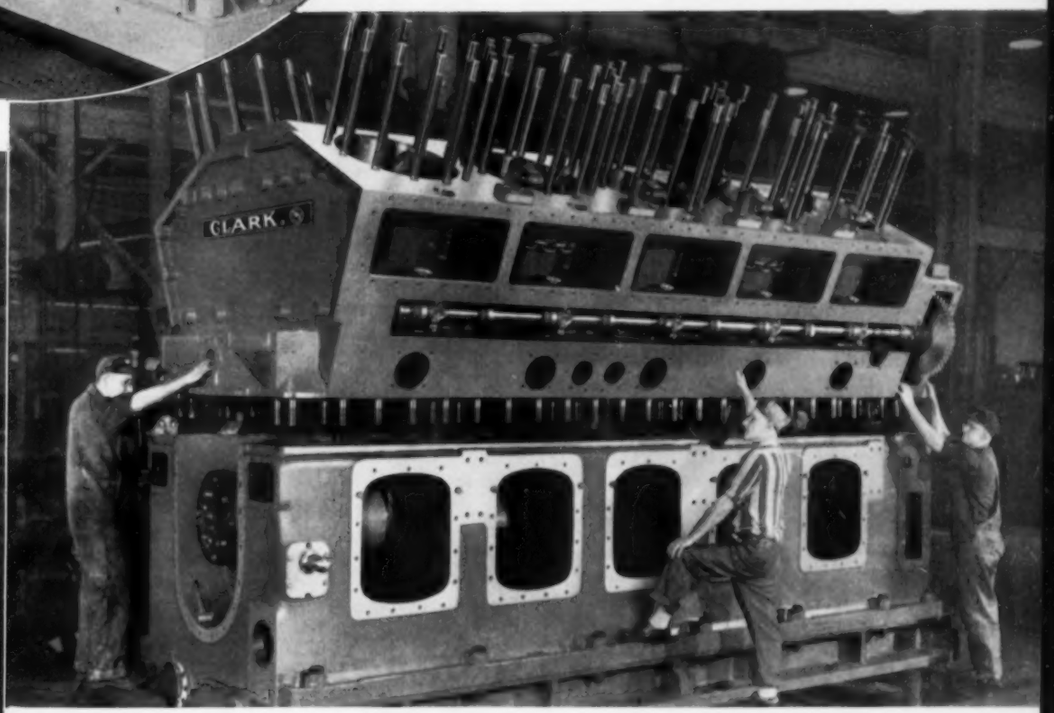


TPV engines will drive big centrifugal pipeline compressors such as this one, a 24 in. x 24-in. Clark.

would be at the latter company's Hampshire (Tenn.) station. This, for the natural gas industry, is also the first combination of a two-cycle V-engine with a centrifugal compressor. Termed an experimental remote control project, the principal components of the installation will be a 10 cylinder, 4000 hp TPV engine; a Westinghouse double step-up gear of lock-train design with a 15:1 ratio; a conventional Clark 24 x 24 centrifugal compressor.

Columbia Gulf President John W. Kelley said the experiment was being conducted to determine the economic advantages of such an installation. In its application to the Federal Power Commission for authority to build the unit on its 30 in. mainline, Columbia Gulf stated that no similar two-cycle-centrifugal combination is at present being operated by any natural gas transmission company. The application also stated that the experiment would provide valuable information to the entire industry, which may enable it to serve the consuming public with greater efficiency and at lower cost. The application was accepted for filing by the FPC. Mr. Kelley said Columbia Gulf had pioneered

Upper and lower crankcase of TPV engine which is available in 4000-6400 hp range—10, 12 or 16 cylinders.



with complete safety. Other features include aluminum main and connecting rod bearings, full pressure lubrication, fully insulated exhaust manifolds, fin and tube type scavenging air intercooler (air temperature is cooled to a 20° approach to ambient), enclosed and lubricated fuel injection valve gear, and two centrifugal water pumps to handle jacket water and scavenging air cooling.

Coincident with the introduction of the new gas engine, Clark Bros. and Columbia Gulf Transmission Co. jointly announced that the first installation of the TPV with centrifugal compressor in compressor station automation to reduce natural gas pipeline operating cost. Known as the industry's "first pushbutton pipeline", Columbia Gulf presently has in operation five automatic and five semi-automatic compressor stations. The experimental installation, which will be built by Clark Bros., is being cooperatively designed by Columbia Gulf and Gulf Interstate Co. of Houston and is due for completion Nov. 1. It is to be completely automatic in operation and will be controlled remotely from the Columbia Gulf gas control center on the 22nd floor of the L & C Tower in Nashville, Tenn.

WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **BERNARD W. LANSDOWNE**

Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as a former editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C. Ltd., Southall, following which he served some five years with that company's sales engineering department. He is now manager-for-the-United Kingdom of a group of business and technical publications.

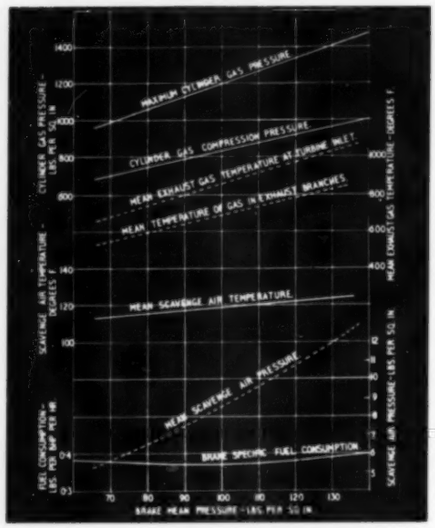
Crossley's Two-Stroke Turbocharged Range

BY featuring two pressure-charged two-stroke designs at the recent Engineering Exhibition in London, Crossley Brothers Ltd. highlighted the developments that have gone on over the years at its Manchester Works in improving the performance of the two-stroke engine. The existing popular Crossley HRN range of loop-scavenged two-stroke engines based on cylinder dimensions of 10½ in. bore and 13½ in. stroke was developed from its earlier HR series, to which Crossley's exhaust pulse pressure charging feature was added.

One of the new engines shown at the exhibition depicted a futher development in this range with the addition of exhaust gas turbocharging. Known as the HRP series, they are rated 50% higher in power than the corresponding HRN design while still retaining the same excellent fuel consumption, reliability and exhaust shade characteristics. The continuous bmep rating varies from 127 psi for the slower speed marine versions to 112.5 psi for engines at higher speeds. The traction rating in the top speed range corresponds with 120 psi bmep. These are healthy outputs for an exhaust turbocharged two-stroke engine, the slow speed marine rating being equivalent to 254 psi. bmep on a four-stroke engine.

No great increase overall engine dimensions has resulted from the addition of the Brush turbocharger because it is mounted above the flywheel where a neat exhaust manifold arrangement conducts the exhaust gases to the turbine and thence to the exhaust silencer. Air supply for the engine is taken by the turbocharger either through a filter mounted directly on the blower or through ducting from an inlet at some convenient external point. Air compressed by the turboblower is passed to an engine-driven scavenge pump, which is either of the reciprocating or Roots type, before entering the air manifold, the scavenge pump thus being in series with the turboblower.

Depending upon the type of duty required of the engine, either charge air cooling or intercooling, or a combination of both, may be applied to the engine. For units fully rated at speeds up to 400 rpm, for example, full advantage of the increase in rating obtainable is achieved by placing an aftercooler between the scavenge pump and the engine cylinders. Above this speed, when the engine-driven scavenge pump is receiving air from the turboblower at relatively higher temperatures, it becomes desirable to use an intercooler between the blower and the scavenge pump. The use of such an intercooler alone is quite sufficient for speeds up to 600 rpm, but for speeds above this and for very high degrees of turbocharging, a combination of both intercooling and aftercooling is required.


MAXIMUM CYLINDER GAS PRESSURE
CYLINDER GAS COMPRESSION PRESSURE
MEAN EXHAUST GAS TEMPERATURE AT TURBINE INLET
MEAN TEMPERATURE OF GAS IN EXHAUST BRANCHES
MEAN SCAVENGE AIR TEMPERATURE
MEAN SCAVENGE AIR PRESSURE
BRAKE SPECIFIC FUEL CONSUMPTION
CYLINDER GAS PRESSURE - LBS. PER SQ. IN.
SCAVENGE AIR TEMPERATURE - DEGREES F.
FUEL CONSUMPTION - LBS. PER B.H.P. PER HR.
MEAN EXHAUST GAS TEMPERATURE - DEGREES F.
SCAVENGE AIR PRESSURE - LBS. PER SQ. IN.
BRAKE MEAN PRESSURE - LBS. PER SQ. IN.

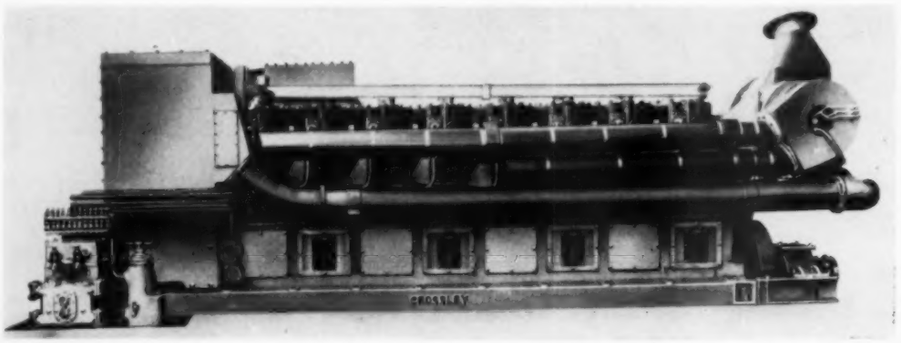
Performance curve of four-cylinder Crossley engine running at 600 rpm.

In applying exhaust turbocharging to these engines, the Crossley exhaust pulse pressure charging feature has been retained, whereby the pulses generated in the exhaust manifold by the exhaust gas issuing from the ports of each cylinder are timed so as to provide charging pulses for other cylinders in turn, thus increasing the density of the charge trapped in the cylinder at the beginning of compression.

Type HTBP Engine

The second new turbocharged design recently exhibited was a six-cylinder unit designated the type HTBP, developing 1350 bhp at 625 rpm. It has the same cylinder dimensions as the other H series and has been designed specifically for high pressure, high output applications of the future. To this end the design has been substantially strengthened with the added safeguards of through-bolt construction, a larger diameter crankshaft, strip copper lead tri-metal coated bearings and other detail improvements. The cylinder centres to diameter ratio is 1:8 with correspondingly increased connecting rod, large end bearing and crankshaft main bearing areas. A further feature for this size straight-line engine is the fitting of two Roots type rotary blowers which are mounted alongside the cylinder block, thus providing a shorter unit. The turbocharger is overhung at the driving end of the engine and delivers air, via an intercooler, to the rotary blowers. This new design is intended for marine, industrial and rail traction applications.

Exhaust manifold side of Crossley's HRP8 engine.



NEW HIGH SPEED POWER TAKE-OFF

A NEW power take-off for high-energy, high-speed applications has been announced by Twin Disc Clutch Co. Designated the model IBF-214P, this unit is said to offer three distinct advantages: 1, it withstands high-energy heat loads; 2, it can be applied to high-speed engines up to 3380 input rpm; and 3, it operates up to six months between lubrication periods.

Too-heavy starting loads often damage power take-offs. They create uneven thermal stresses, which cause minute cracks in the center plate and eventually lead to clutch failure. Twin Disc claims that its new PTO overcomes this problem by means of a ventilated center plate. This plate is designed in two sections with diagonal ribs cast into each section. Placed back to back, the ribs cross each other to form only small diamond-shaped contact areas, permitting air flow to dissipate excess heat. Clutch action in the model IBF-214P eliminates heavy counterweights, improving overall balance and reducing link and stresses so that clutch speed can be increased considerably. With standard cast iron driving ring, maximum rated speed is 2500 rpm. An optional nodular cast iron ring increases this rating to 3380 rpm.

The model IBF-214P features a large tapered roller bearing to withstand heavy side loads. Oil, rather than grease, is used for bearing lubrication so as to assure safe operating temperatures at the high speeds for which the unit is designed. The top of the bearing carrier has a small cast cavity which is kept full of oil by a slinger dipping into the sump. A drilled hole from this cavity feeds the bearing to maintain constant oil circulation.

A clutch engagement mechanism cuts throw-out collar wear; there is no contact between the cam followers and the sliding clutch sleeve except when the clutch is being engaged or disengaged. For this reason, Twin Disc claims that throw-out collar lubrication is needed only twice a year in normal service (less than ten engagments per day). Details and specifications on the Model IBF-214P power take-off can be obtained by writing Twin Disc Clutch Co., Racine, Wis.

Ventilated center plate of IBF-214P power take-off is designed in two sections with diagonal ribs cast into each section.

Cross section of Twin Disc IBF-214P power take-off.

SMALL I-H TRACTOR IS TURBOCHARGED

A TURBOCHARGER is standard equipment for the first time on a small International Harvester crawler tractor. It is the AiResearch model TO603, which comes with the newly-introduced six-cylinder International TD-9 diesel tractor. Among the smallest in production today, the turbocharger weighs 24 lbs. and measures 7¾-in. in diameter, about the size of a salad plate.

The turbocharger was developed by The Garrett Corporation's AiResearch Industrial Division and International Harvester Co. It boosts by a considerable percentage the power output of International's new D-282 six-cylinder diesel engine used in the TD-9 crawler. Torque is increased by 18 per cent over that of a naturally aspirated engine; engineers compute a 10 per cent fuel savings.

Of simple design, the TO603 has a relatively small number of parts. Garrett says that this factor permits high quality production at an economic cost. An important contribution to the simplicity and efficiency of the turbocharger is the vaneless design of the compressor and turbine housings. This eliminates the need for nozzle rings. Vaneless design provides a flow range which enables the engine manufacturer to cover a broad engine operating range with one turbocharger.

A model TO603 turbocharger, incorporated for the first time in a small International Harvester crawler tractor, is viewed by Wolfgang G. Schlegel (left), engineer for The Garrett Corp., whose AiResearch Industrial Division produced the turbocharger, and Homer F. Griffith, manager of International Harvester's Tractor Works. The turbocharger is standard equipment on the new International TD-9 diesel crawler tractor. The tractor uses International's new D-282 six-cylinder engine.

DIESEL SERVICE PROGRESS

A COMMENTARY BY **GEORGE R. MACKEY**

George R. Mackey was long associated with Detroit Diesel Engine Division of General Motors Corp., and had prior experience as a mechanic in Europe and the U.S.A., which enabled him to become well acquainted in the diesel and service fields and to obtain a broad scope of the service industry from the customer's and management's viewpoint. Further training at Carnegie Tech and in the Army Ordnance during World War II provided the necessary requirements in planning service programs. Progressive advancement in diesel service areas in General Motors and with Detroit Diesel led to his position as Supervisor of Service Promotion. Upon termination of employment with General Motors in 1952, he joined Clayton Manufacturing Company, and his present position with this organization is Sales Manager of the Dynamometer Division.

Advertising To Reach Engine Users

THE retail service operation can use many forms of service advertising to reach the individual engine user. The most common methods and, in many instances, the most practical are: direct mail, mail stuffers, calendars, novelties and handouts. Although one form may be more effective in some types of operations, or may appeal to the service manager, each type has certain advantages. Direct mail can be aimed at people with authority and can be made personal. The cost per contact is relatively low, does not require specialized personnel, can be read and acted upon at the owner's convenience, lends itself to local or distant distribution and permits control of the message and form to be used to attract the owner's attention. While various forms of direct mail—letters, booklets, catalogs—are commonly used, each has its place. The advantage of one in meeting a specific requirement or local condition may be the deciding factor. For example, a letter is generally considered personal but, of necessity, must be brief and to the point and cannot contain much in the way of illustrations. A folder may contain illustrations and an appropriate message, yet it loses much of the personal quality and is usually more costly.

While direct mail is generally planned to influence the service customer, it can be used to supplement the information recorded in the service department. One service manager periodically sends out a simple, inexpensive post card-type piece of advertising to all of his engine users, with return postage guaranteed, as a means of keeping active and checking the accuracy of the names and addresses on his list. Direct mail advertising will meet the requirements of most promotional programs. The advantages of the various forms should be studied carefully to select the best approach. Many manufacturers make available factory-prepared direct mail advertising for the use of distributors or dealers. Such programs are extremely beneficial because they reduce the cost per piece by volume production, permit a better quality at a lower cost, eliminate the possibility of errors, inaccurate claims or statements about the product or policies.

A complete direct mail program could include a series of form letters, over the signature of the service manager, to remain users of the maintenance needs of their engine equipment and available service facilities. To be effective, such letters should be sent on the basis of the estimated number of hours the user's equipment has been in operation. This estimate can be derived through use of the dealer's unit files and service records. The ultimate value of a service manager's program with a direct mail campaign will depend upon how well the mailing list is organized and the quality of mail pieces used. The mailing list must be kept current and all messages on the mail pieces should be directed to the proper individual in the user's organization.

Proper timing of mail advertising is important and influences the effectiveness of a direct mail program. Close analysis of mailing habits and the receiver's reading habits show that mail received is heavier at the end and beginning of the month. Mail received on Monday is generally heavier than that received during the middle of the week. Mail received on Friday or Saturday is not read and digested as thoroughly as when received during the middle of the week. This is also true of mail received the day prior to a holiday. Advertising mailings, therefore, should be planned to arrive after the Monday rush and the day before a weekend letdown.

Mail Stuffers to Advertise Service

The use of mail stuffers for service advertising is disliked by some managers; nevertheless, certain advantages of stuffers cannot be overlooked. Stuffers provide large volume of distribution at low cost. They can be placed in envelopes with other forms of correspondence, such as invoices and technical information, without any additional cost. The message can be varied economically.

Calendars, Novelties and Handouts

The use of calendars, novelties and handouts as a part of a continuous advertising program is very effective and popular. Calendars are used extensively because they are relatively small, legible, practical and can illustrate the service organization's facilities. The daily use of such an item makes it invaluable. The calendar was used in a unique way by an alert manager to suggest regular engine maintenance based on average hours of operation. A similar method was also used to indicate seasonal maintenance. Adequate space was provided on the calendar for engine owners to keep a daily running log of their operations.

Novelties and handouts are popular methods of keeping a company's name before the customer. Items such as matches, pencils, rulers, money clips, cigarette lighters and wallets may be used in this form of promotion. These items provide a tailor made form of advertising with retention value. Among other numerous give-away items was the effective use of packaged transparent raincoats in an organized promotional program. Subscriptions to a local trade magazine in which a distributor features regular advertising is another proved method of reaching the customer. An enterprising distributor employed still another form of advertising by supplying golf carts for the exclusive use of his customers at the local golf course.

Any of these forms of promotion will work if properly used, They, however, should be a part of a continuous program. An organized promotional program will not succeed without supporting quality service; word of mouth advertising is the cheapest, most effective means of promotion.

Dr. Buchi Celebrates His 80th Birthday

Dr. Alfred J. Büchi of Winterthur, Switzerland, celebrated his 80th birthday last July 11. He was in excellent physical and mental health. During his many years of successful activity Dr. Büchi has rendered outstanding services to the diesel industry. As early as 1905, Dr. Büchi filed patents for his first creative ideas in further development of internal combustion engines. These involved the employment of the hitherto unused exhaust gases in their lower temperature range to drive a charging blower. Even at this early stage his design made provision for cooling the charging air.

With a view to developing the exhaust-type turbocharging on a broader basis, the Büchi Syndicate was founded in 1926 with the inventor, the Swiss Locomotive and Machine Works in Winterthur (engine building) and Brown, Boveri & Co., Baden (turbochargers) as partners. Professor A. Stodola

Dr. Alfred J. Buchi

carried out detailed experiments with an improved plant of this kind. The precalculated results were fully confirmed. The European engine-building industry took an increasing interest in the Büchi turbocharging system with the result that many stationary power stations, ships, locomotives and road vehicles could be fitted with it. This lead was followed by the engine-building industry of the United States and Japan. The American Locomotive Co. and Elliott Co. began to make Büchi turbochargers under license. By 1945, American engine firms had built as many machine combinations as the rest of the world combined. Since the end of World War II, production in the United States has been higher still.

In recognition of his services in the development of the exhaust turbocharger, the American Society of Mechanical Engineers in New York awarded Dr. Büchi the Melville Medal in 1937. In 1938 the Swiss Federal Institute of Technology conferred on him the honorary doctorate of engineering. Dr. Büchi also holds the Henderson Medal of the Franklin Institute.

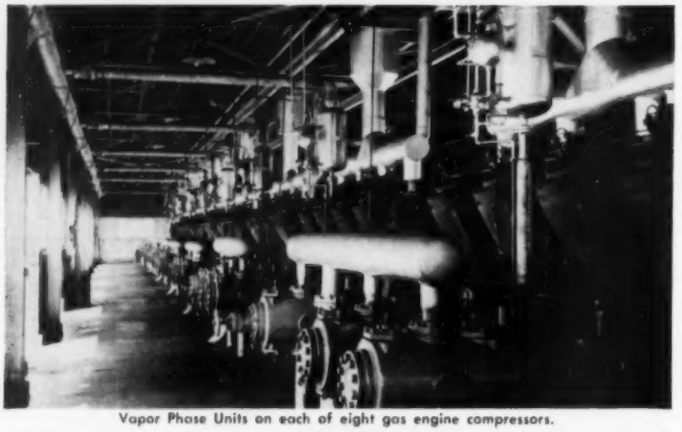
The further development and application of turbocharging is proceeding very fast today. Fitted with the exhaust turbocharger, the diesel and gas engine has become the most efficient prime mover in the world for converting heat into mechanical power. In the pure exhaust turbocharger system which Dr. Büchi has helped to establish in a wide field of application during a period of 50 years, the engine supplies the usable power while the exhaust turbine and the blower function as an auxiliary unit for enhancing output and economizing fuel. On the basis of his many years of experience Dr. Büchi now believes that there is a great future for the other arrangement, i.e. a system in which the exhaust turbine alone supplies power and the diesel or gas engine serves simply to generate the power gas and to drive the charging and scavenging blower. This forecast illustrates how Dr. Büchi's mind works constantly in the pursuit of new ideas.

Rubber-Tired Roller Has 65 hp Diesel

A new model (the SP-54B-D) of its recently introduced 10-ton-capacity rubber-tired, self-propelled roller (SP-54B) has been announced by Bros, Inc. The SP-54B-D has a Hercules DD-226 four-cylinder diesel engine which develops 65 hp at 2000 rpm. Equipped with a torque converter, the self-propelled roller travels at speeds up to 20 mph. Other features include lower center of gravity; improved power steering, reversing clutch, and transmission; brakes on all four drive wheels; larger brake drums; and parking brake connected directly to drive shaft. Each wheel is equipped with a plastic scraper for asphalt or sealcoating compaction work.

The World's Leading Manufacturers of
FUEL INJECTION EQUIPMENT
for Diesel Engines
Depots and Service Agents
in over 100 Countries
C.A.V.
FUEL INJECTION EQUIPMENT DIVISION
of
LUCAS ELECTRICAL SERVICES, INC.
Head Office: 501 West 42nd Street, New York 36
Sales Office: 14820 Detroit Avenue, Cleveland 7, Ohio
West Coast: 5025-29 W. Jefferson Blvd., Los Angeles 16, California
Branch Offices:
643 7th Street, San Francisco, California
4937 West Belmont Avenue, Chicago 41, Illinois
400 South Edgewood Avenue, Jacksonville, Florida
Canadian Distributors: Joseph Lucas (Canada) Ltd.
Head Office: 11 Davies Avenue, Toronto 8, Ontario
Branch Office: 3401 St. Antoine Street, Montreal 30, Quebec
AI935

VAPOR PHASE® PUTS ENGINE HEAT TO WORK, CUTS FUEL AND EQUIPMENT COSTS AT TIDEWATER'S VENTURA PLANT



Vapor Phase Units on each of eight gas engine compressors.

BEFORE VAPOR PHASE®

Power at the VLW Lease Gas Compressor Station consisted of eight Gas Engine Compressors of 2250 BHP total.

Engines were cooled by large radiators with fans, driven by separate multiple cylinder gas engines.

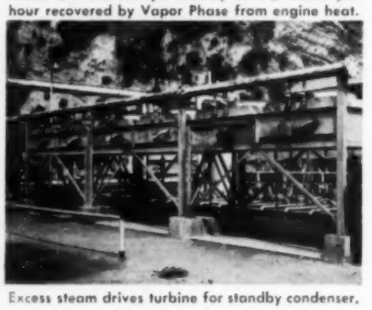
Gas-Fired Oil Heaters were used to separate water and sludge from crude oil.

Therefore Tidwater had the cost of additional engines and fuel to cool compressors, plus fuel cost to heat oil.

Crude Oil Treaters operated by 4000# steam per hour recovered by Vapor Phase from engine heat.

AFTER VAPOR PHASE® INSTALLATION

1. Engines are cooled by thermal circulation providing uniform temperature throughout the engine.
2. Separate gas engines to run radiator fans are eliminated.
3. Recovered heat from the engines produced 6750 pounds steam per hour which is fully utilized.
4. Gas-Fired boiler is eliminated.
5. 4,000 pounds of steam per hour heats the crude oil to separate water and sludge from oil.
6. Excess steam is used to heat the workmen's locker room and to drive a steam turbine for the standby condenser-engine cooler.
7. Engine maintenance is reduced.



Excess steam drives turbine for standby condenser.

E C VAPOR PHASE

ENGINEERING CONTROLS, Inc.

AN AFFILIATE OF ST. LOUIS SHIPBUILDING & STEEL CO.

611 E. Marceau
St. Louis 11, Mo.

1939 N. Hillhurst Ave.
Los Angeles 27, Calif.

Electric Machinery Elects New Officers

Mr. Arthur P. Burris, former sales vice president of Electric Machinery Mfg. Co., has been elected its president and general manager. Mr. C. E. Buchan, former general sales manager, succeeds Burris as sales vice president. Burris joined E-M in 1930 and was successively Minneapolis, Kansas City and New York district manager. He became vice president of sales in 1950. He is a graduate of the Institute of Technology, University of Minnesota. Buchan, Cleveland district manager for 30 years, became general sales manager in 1954. He is an electrical engineering graduate of the Milwaukee School of Engineering. These changes are the result of the election of Mr. R. H. Olson, former E-M president, as a group vice president of Worthington Corp., parent corporation of E-M. He was also elected chairman of the board of Electric Machinery Mfg. Co.

C. E. Buchan

Arthur P. Burris

AiResearch Industrial Division Announces Organizational Changes

Hans Egli

Organizational changes have been made in engineering and production areas at The Garrett Corporation's AiResearch Industrial Division. The revisions were made because of an anticipated broadening of current product lines and the addition of new product lines, Mr. Wilton Parker, division manager, announced. Mr. Hans Egli, formerly engineering manager, was named chief engineer; Mr. Al Silver, formerly senior project engineer, valves, was appointed assistant chief engineer; Mr. John Cazier was advanced from project engineer, turbochargers, to senior project engineer, turbocharger systems; and Mr. Robert Cholvin, was moved up from project engineer, valves, to senior project engineer, valves and control systems. All four men are veteran AiResearch Industrial Division employees. Mr. William Grierson, formerly with Aero-Jet General Corp., was named to the newly created position of manager of quality control.

Mr. Roy Hughes, formerly of Aero-Jet General and Western Gear, has been appointed assistant to Lloyd Olmsted, production manager. Mr. Bill Holland was named foreman of the development machine shop. Mr. John Guest, has assumed the position of supervisor of plant engineering and maintenance. Mr. Jack Sutherland has been appointed supervisor of production engineering.

Napier Promotes Willmott

Colin Willmott

Mr. Colin Willmott has been appointed industrial and marine manager of Napier Engines, Inc. He will make his headquarters at the company's Washington offices. Mr. Willmott for the last year has been Deltic engine representative for Napier in New Orleans, La., for the Gulf Coast area. His responsibilities now include the balance of the United States and the Caribbean area. With Napier since 1954, Willmott is a former engineering officer with the British army. He is a graduate of Cambridge University, England.

Electric Machinery Makes Four Sales Appointments

H. W. Forschner

Four headquarters sales appointments have been announced by Electric Machinery Mfg. Co., Minneapolis, Minn. They are: Mr. Homer W. Forschner, former headquarters sales manager, to general sales manager; Mr. C. M. Burns, former sales supervisor, to headquarters sales manager; Mr. J. H. Jones, former service manager to manager contract administration; and Mr. K. L. Hanson, former sales supervisor, to manager, large apparatus sales. All four have electrical engineering degrees.

Holverstott Promoted by Delco Products

C. L. Holverstott

Mr. Carl L. Holverstott has been promoted to sales manager of the Industrial Motor and Generator section of Delco Products Division of General Motors Corp., Dayton, Ohio. He will be responsible for nationwide sales of Delco's line of heavy duty motors and generators. Holverstott began his Delco career in 1939 as an engineer.

Cooper-Bessemer Names Martin To Manage Houston Office

Earl Martin

Mr. Earl Martin has been named branch manager of the Houston office of The Cooper-Bessemer Corp. The elevation of Mr. Martin fills a vacancy created by the retirement of Mr. R. H. Dale. Martin will be in direct charge of both application and sale of Cooper-Bessemer compressors and engines in the Houston area. He also will be directly responsible for the operation of the company's regional warehouse facilities.

equip for the **BOOMING 60's**

install Viking Pumps now!

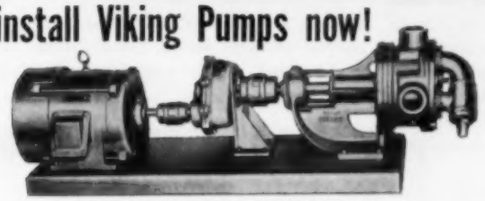


FIG. 288, HEAVY-DUTY PUMP WITH HELICAL GEAR DRIVE

Are you looking ahead to peak production? Will your pumps be operating full time, returning your investment, through the 60's . . . or will they need service and replacement?

You can depend upon VIKING POSITIVE DISPLACEMENT PUMPS to return your investment . . . to stay on the job . . . to give you FAST priming, strip your tanks if desired . . . to move thin or viscous liquids without excessive turbulence.

Read these actual statements from Viking Pump users—solid proof of top performance:

"This rugged old-timer of 25 years' service and NO repairs convinced us to buy a whole plant full of Vikings."

"I'm buying a heavy-duty Viking to add to my line. From the service I have had on the one for the past several years, I'll not hesitate to buy this improved model."

Look ahead to the 60's! And look to Viking Pumps for profitable operation. For information on the newest Viking Pumps send today for catalogs SP-488D.

VIKING PUMP COMPANY
Cedar Falls, Iowa, U.S.A. In Canada, it's "ROTO-KING" pumps

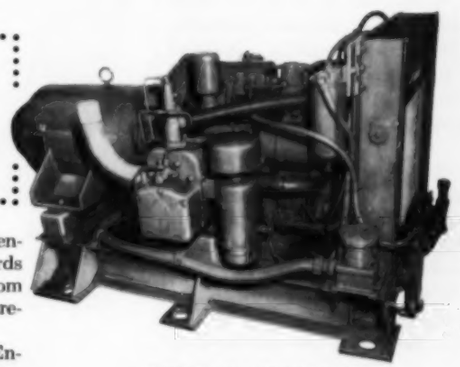
See Our Catalog in Sweet's Industrial Construction and Plant Engineer's File

The WITTE 100 RDA Diesel Engine-Generator Unit

Is designed specifically for railway mechanical refrigeration.

The 100RDA Provides These Advantages:

1. SHOCKPROOF 2. DEPENDABLE 3. LOW FIRST COST 4. MINIMUM MAINTENANCE ATTENTION 5. LARGE ENGINE PERFORMANCE with small engine economy.



HERE IS a compact, powerful diesel engine-generator unit that is setting performance records in maintaining temperature ranges varying from −10°F. to 70°F. in 40′ and 50′ mechanically refrigerated railway cars.

Its low profile (33") makes the Witte 100 Engine, which powers this unit, outstanding in either stationary or mobile applications. The horizontally-opposed cylinders provide inherent balance to make it smooth in operation and stable in performance. It has proved its DEPENDABILITY in the demanding railway field, where LOW FIRST COST yet exclusively-engineered railway features are necessary. MINIMUM MAINTENANCE ATTENTION is required with . . . 1200 hours between oil and filter changes . . . auxiliary fuel oil system, with day tank . . . brushless 12½ KW generator. It gives LARGE ENGINE PERFORMANCE with small engine economy.

USS and Witte are registered trademarks

Brief Engine Specifications

Bore and Stroke	4" x 4"
Cycle	4
Displacement	Cu. in. 100
Speed	rpm 1800
Horsepower: Continuous	18
Maximum (Bare Engine)	23.7
Height	inches 33
Width	inches 40½
Length (Approximately)	inches 66

USS **Witte Engine Works**
Oil Well Supply Division of United States Steel

1615 Oakland Avenue, Kansas City 26, Missouri

Michigan-Ohio News

By **Jim Brown**

GLENN Sawyer, a 16-year employee of Wolverine Tractor and Equipment Co. of Detroit and Grand Rapids, has been appointed Detroit sales manager. For the last 10 years he has been service director of the company, which sells International Harvester, Galion and Hough diesel and gasoline-driven construction equipment throughout Michigan's lower peninsula.

CYRIL J. Burke, Inc., of Detroit reports the sale of two Pettibone-Mulliken front-end loaders to Northeast Construction Co., Detroit. One of the loaders is a model 175D, equipped with a 2¼-yd. bucket and powered by a Hercules DD-339 diesel engine; the other loader is a model 440 equipped with a 4-yd. bucket and powered by a Cummins diesel engine.

GORDON Sellway of Detroit recently purchased an Allis-Chalmers model HD-11E crawler tractor from the Earle Equipment Co., Detroit. The new tractor is equipped with an hydraulic bulldozer and is powered by an A-C model HD-516 diesel engine.

MILLER Equipment Co., Livonia, Mich., reports the sale of a Michigan model 180 tractor-shovel to Grolean Bros. of Berkley, Mich. The new Michigan is powered by a model JT-6-BI Cummins diesel engine.

APPOINTMENT of Joseph R. Henninger, Jr., as a diesel engine representative was recently announced by Kenneth R. Dickinson, vice president-sales manager of Michigan Tractor & Machinery Co., Detroit. Henninger is a graduate electrical engineer and was formerly connected with Albert Kahn Engineering and Harlan Electric Co., Detroit.

THE E. R. Tank Irrigation Sales Co. of Detroit has sold and installed a Mercedes-Benz OM 321 diesel engine in a Rain-Aid irrigation system for Smeltzer Brothers Orchards, Copemish, Mich. The Mercedes-Benz diesel will pump approximately 600 gpm at 100 to 125 lb. pressure to irrigate 200 acres of fruit trees.

PENINSULAR Diesel Inc. of Detroit has converted a model TMDT-16 Michigan crane from gasoline to diesel, using a model 3058C GM Diesel engine. The installation was done for Franklin Iron and Metal of Battle Creek, Mich.

MACKINAW Co. of Essexville, Mich. is converting its fleet of B-70 Mack trucks from gasoline to diesel with model NH-220-B Cummins engines. The company also is purchasing a number of new B-70 Mack trucks with Cummins power. In the last few months they have acquired seven such units. Cummins Diesel Michigan Inc., Dearborn, is the engine supplier.

THE R. L. Coolsaet Co., Dearborn, has accepted delivery on an International model TD-9 tractor with bull-grader blade. Sale was made by Wolverine Tractor & Equipment Co., Detroit and Grand Rapids.

MICHIGAN Tractor & Machinery Co., Detroit reports three recent sales of its 150 hp. model 14 Caterpillar motor grader. One was sold to MacLean Construction Co., Detroit, and two were sold to Sugden & Sivier, Oak Park, Mich.

WHALEN Limestone Co., Karo, Mich., has accepted delivery on a new International TD-20 crawler tractor. Sale was made by Wolverine Tractor & Equipment Co., Detroit and Grand Rapids.

ART Jennings of Fenton, Mich., is breaking in a new model 250 Pettibone-Mulliken loader on sand and gravel loading. The loader is equipped with a

THERE'S NEWS BEHIND

...AND AMERICAN BOSCH IS

3¼-yd. bucket, is powered by a model 4-71 GM Diesel engine and was purchased from Cyril J. Burke Inc., Detroit.

OWNER of Detroit's Weissman Excavating Co., Cy Weissman has accepted delivery on a model HD-11E Allis-Chalmers crawler from Earle Equipment Co., Detroit. The new crawler is equipped with an hydraulic bulldozer and is powered by a model HD-516 Allis-Chalmers diesel engine.

MILLER Equipment Co., Livonia, Mich., has delivered a model 175A Michigan Tractor shovel to Charles Van Every of Northville, Mich. The new Michigan is equipped with a 2¾-yd. bucket and is powered by a model 135-DKB Waukesha diesel engine.

WOLVERINE Tractor and Equipment Co., Detroit and Grand Rapids, has completed installation of equipment in its Detroit service department. This enables the firm to recondition worn tractor idlers, sprockets and rollers. The company is now equipped to rebuild rollers by the automatic welding process and by machining to factory specifications. Idlers are also built up by the same process, and sprockets are renewed by replacing worn rims with new rims.

CUMMINS Diesel Michigan, Inc., of Dearborn, Mich., recently converted a 1956 F-800 Ford from gasoline to diesel, using a 175 hp JT-6-B Cummins diesel. The installation was ordered by William Armstrong, who hauls autos from Detroit to the West Coast. Cummins Diesel Michigan, Inc., reports that fuel costs for Mr. Armstrong are now almost 50% less since the installation was completed.

COLE Bros., Battle Creek, Mich., has accepted delivery on a Koehring 405 dragline equipped with a 1½ yd. Page bucket and powered by a model 4055C GM Diesel engine. The sale was made by Earle Equipment Co., Detroit.

LAPEER (Mich.) County Road Commission has accepted delivery on a model T-500 motor grader powered by a Cummins JN 6-BI diesel engine. Sale was made by Wolverine Tractor and Equipment Company, Detroit and Grand Rapids.

THOMPSON Sand and Gravel Co., Northville, Mich. has repowered a Model 175-A Michigan front-end loader with a 155 bhp Mercedes-Benz OM 315 engine. The sale and installation were handled by Helz Contracting Machinery Co., Mercedes-Benz distributor for eastern Michigan.

CUMMINS Diesel Michigan Inc. of Dearborn, has in the last two months installed seven Cummins engines in Ford tractor-auto carriers. The owners, all of whom reside in the Detroit area, are: Omar Campbell, James Ireland, Clifford Wallace, William Nelson, Les Peck, Clayton Whirley and Ernest Downing.

Short Course Sept. 20-24 for Plant Engineers, Operators

A short course for diesel plant engineers and operators, sponsored by the Extension Division of the University of Illinois, will be held Sept. 20-24 at Allerton Park, Monticello, Ill. Persons interested in attending should write Mr. R. K. Newton, supervisor of engineering extension, 116 D Illini Hall, Champaign, Ill.

Nordberg Names Sales Engineer

Appointment of Mr. John A. Snarenberger as sales engineer assigned to the Kansas City territory was announced recently by Nordberg Mfg. Co., Milwaukee, Wis. Snarenberger will assist Mr. J. T. Adams, Kansas City district manager, in municipal, industrial and pipe line sales for Nordberg's two and four-cycle engines.

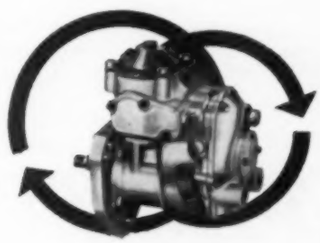
D THIS DIESEL SPEEDOMETER

The story is this: For mile after demanding mile . . . from Pike's Peak to the New York Thruway . . . in extremes of weather and terrain . . . American truckers move their diesels around the speedometer with amazing efficiency, literally keeping the economy on the go. And American Bosch fuel-injection systems are at the heart of the picture.

Truckers all over the country—and overseas—report their American Bosch-equipped diesels regularly go up to 500,000 miles without engine overhaul or major repair. In fact, several such diesels have passed the 700,000-mile mark and are still going strong. That's why American Bosch fuel-injection systems are used as original equipment by many major diesel engine manufacturers in the country.

American Bosch, the nation's largest independent manufacturer of diesel fuel-injection systems, also produces many other important industrial, consumer and defense products, including hydraulic starting systems, actuating motors, pulse generators, magnetos, accumulators and a variety of automotive products . . . for use wherever performance and dependability have first priority. American Bosch, Springfield, Massachusetts, a division of American Bosch Arma Corporation. 7012

AMERICAN BOSCH ARMA
CORPORATION



THE HEART OF THE PICTURE

Florida Diesel News

By Ed Dennis

FROM Florida-Georgia Tractor Co., two model 65 International Payhaulers, 18 tons, powered with Cummins NT-6-I diesel engines with a max hp of 250 at 2100 rpm and a Fuller 10-F-1220 transmission for R. J. Stafford of Fort Lauderdale to haul rock from pit to crushing plant for Fern Crest Quarries.

JACKSONVILLE: Gibbs Corp. launched the 153 ft. *R. L. Haynie Jr.*, a menhaden fishing vessel for the Reedville Oil & Guano Co. of Reedville, Va. It is powered by a pair of Caterpillar D397 turbocharged 500 cont. hp marine diesels. The same yard is converting a former T2 tanker into a dry bulk carrier. Mid South Towing also ordered a new 153 ft. towboat to be constructed by St. Louis Shipbuilding and powered by two Fairbanks-Morse opposed piston diesels, each rated 1600 hp. It will be used to tow this new dry bulk carrier.

THE *Black Cat* a 34 ft. fishing craft berthed at Marathon, was repowered with a model 135-DKB Waukesha diesel engine with a cont. hp rating of 100, 2:1 Capital r&r gears, 24x24 propeller for a speed of 18 mph at 2000 rpm. Capt. Theron Lowe is the skipper. From Simplex Sales Co., Inc., Miami.

RYDER Trucking Co. is repowering two gasoline powered R-195 International trucks with GM Diesel 4172E engines with five speed Fuller 5-A-430 transmissions and 1790 Eaton rear axles with 4.87 ratio.

WILHOIT Steel Erection Co., Columbia, S. C., took delivery of a P&H 775, 70 ton truck crane. Both truck and crane are powered by P&H 687C diesel engines rated 180 cont. hp at 1800 rpm. The truck end has a Fuller transmission and the crane a Cotter transmission.

ANDY's Truck Service of Hialeah took delivery of a 16 wheel low-bed trailer with a 60 ton capacity. Tractor has a 165 hp Cummins diesel engine and a Fuller 10 speed forward, 2 speed reverse transmission.

THIRTY-FOOT *I. M. S.* (Indianapolis Motor Speedway), a pleasure craft, has been repowered with two of the GM Diesel 4-53 marine engines, each rated 85 hp at 2200 rpm and Borg-Warner 2:1 r&r gears.

HOMESTEAD Municipal light plant, which has Fairbanks-Morse diesel generating sets (capacity of 10875 kw) will convert to natural gas when pipeline is extended from Miami to Homestead.

BELCHER Oil Co. had a model OM 636 Mercedes-Benz diesel engine, rated 36 hp, and a 10 kw Onan generator installed in a 73-ft. schooner for use as a power plant.

FOLLOWING Cummins diesel engines have been installed by Cummins Georgia Diesel Inc.: a model NH-220 in a Mack LJT tractor for J. A. Morgan Produce; an NTO in another Mack for Southeastern Highway Paving Co.; and a model JT-6-B, rated 165 hp, in a truck for Ryder Truck Rentals at Atlanta, Ga.

TWO Allis-Chalmers model 45 motor graders, powered by 6 cylinder, 120 hp Allis-Chalmers diesel engines, and an Allis-Chalmers HD-6-G tractor shovel with an Allis-Chalmers 57.3 drawbar hp diesel engine and 1½-yd. bucket, are being used on a pipeline construction job near the Miami International Airport.

MEADOWS Southern Construction Co. took delivery at Orlando of Caterpillar's new series G DW21 tractor to pull scrapers. Tractor has a 345 max. hp Cat diesel engine.

WAUKESHA dieselized 10.5 kw 115/230 volt Kohler generating set was installed on the *Colonel Alabama* of Birmingham. The main propulsion is a pair of 6-71 GM Diesel engines, just converted from 200 hp to 235 hp and GM 2:1 hydraulic r&r gears.

LAKE Ida, Del Ray Beach: Grimes Mfg. Co. took delivery of an Insley model L dragline powered with a GM Diesel 3057C. A similar machine with the same GM plant went to All Construction Co., Dania.

WHITE Superior model 40-SX-8 supercharged engine, 575 hp at 900 rpm, 106 bmep, with a Marathon Electric 400 kw 120/208 volt generator has been installed for standby use at the S. C. Data Reduction Laboratory Building, Eglin Air Force Base.

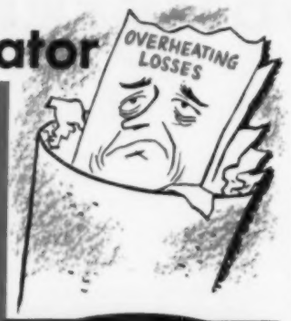
GRADALL machines with GM Diesel 3-71 engines, Borg & Beck clutches and Commercial hydraulic pumps were delivered to Joe Reinertson and Troup Bros., road and sewer contractors.

THREE model PTD-6 White Superior diesel engines, each rated 300 hp at 900 rpm, with duplex Purolator lube oil strainers and Michiana filters, are being used for main power at the oil well being drilled at Forty Mile Bend on the Tamiami Trail by Gulf Coast Drilling & Exploration Inc.

Alco Promotes Pair in Advertising Department

Alco Products, Inc. has announced new appointments in its advertising and public relations organization. Mr. Arthur A. Batts, Jr., who had been director of advertising and market research, was named director of advertising, public relations and market research. Mr. Roger C. Witherell, former manager of the company's news bureau, was appointed manager of public relations. Mr. Dana T. Hughes, former director of public relations, resigned to form his own public relations firm in Philadelphia. Batts joined Alco in 1954 as director of market research. He was named director of advertising and marketing research early in 1956. Witherell has been with Alco since 1956, when he was named news bureau manager.

Fail-Safe Regulator Ends Overheat Dangers!



This Series 1006 Fulton Sylphon® Safety Temperature Regulator has a built-in monitor that prevents damage to engine due to sudden overheating caused by failure of thermostatic unit. Should corrosion, vibration or other accidents cause loss of the thermostatic charge, the control valve assumes "safe" position automatically.

Higher sensitivity, greater power, longer life, trouble-free operation assured by large two-ply seamless Sylphon Bellows. Completely self-powered. Sizes ¼" thru 4"; single- or double-seated and three-way valves. Teflon chevron "life-time" valve stem packing ends leakage . . . provides smoother control . . . requires no lubrication.

Regulator for liquids shown above. Also available with fin type bulb for controlling air or gases.

For complete information, write for Bulletin D-RD

Mr. Controls®

Robertshaw-Fulton CONTROLS COMPANY

FULTON SYLPHON DIVISION • Knoxville 1, Tennessee

New Synchronous Vertical Motors

New high speed synchronous vertical motors in a wide range of enclosures are now offered in 150 hp and up, frames 584 and larger by the Ideal Electric and Mfg. Co., Mansfield, Ohio. Long insulation life while the motor is operating at full capacity, continuous duty is achieved through use of a double-end ventilation system. In addition to standard A, B and H insulations, a number of special materials, including silicone rubber, acrylic and epoxy resins and other materials, can be supplied to meet unusual moisture, ambient and chemical conditions. Routine maintenance and inspection of the Ideal synchronous vertical can be accomplished without major disassembly. Angular contact, spherical roller and Kingsbury thrust bearings are available, depending on speed and thrust to be encountered. Couplings designed to protect the motor and the pump under specific conditions are available. Several methods of excitation can be provided, including direct-connected exciters, motor generator sets and excitation for the plant DC power supply. For additional information write The Ideal Electric and Mfg. Co., 330 E. First St., Mansfield 17, Ohio.

Waukesha Adds Branches

Waukesha Motor Co., Waukesha, Wis., has announced plans for three new branches in southern California. It also has announced purchase of the entire inventory of Waukesha and Climax engines and parts formerly held by its distributor, Waukesha Southern California, which previous to its incorporation in the Waukesha distributor system, had been the supply division of the Bethlehem Pacific Coast Steel Corp. Included in the purchase were the automobiles, trucks, engineering records and blueprints, furniture and fixtures, various equipment and machinery, bins, cranes and hoists, located in Bethlehem's establishments at Watts, Bakersfield and Ventura. Waukesha will now have three new branch operations in these same locations, in addition to the present branch offices and warehouse located at Vernon, Calif. Watts and Vernon are in metropolitan Los Angeles.

Catalog on Harbormasters

Recently released by Murray & Tregurtha, Inc., *Harbormaster Outboard Propulsion and Steering Units* (Catalog No. 596, 12 pages) gives latest information on heavy-duty, marine power and steering packages. Included are features of design and construction, specifications of the models, which range from 40 to 500 hp. gas or diesel, and photos of Harbormasters in action. Write Murray & Tregurtha, Inc., 80 Hancock St., Quincy 71, Mass. (ITS NEW)

Miller, Wachowiak Join Minneapolis-Moline Co.

Two appointments have been announced by Minneapolis-Moline Co., Hopkins, Minn. Mr. James A. Miller, chief engineer of lift trucks for Clark Equipment Co., was named director of engineering. Mr. Maxwell M. Wachowiak was appointed director of manufacturing. He formerly was executive vice president of Wall Tube and Metal Products Co., Newport, Tenn.

Miller, who majored in engineering at Georgia Military College, also formerly was associated with Ford Motor Co. and Borg-Warner Corp. He holds numerous patents in the field of power transmission. Wachowiak formerly was with Union Electric Co., Allied Chemical Co., Western Brass Division of Olin Mathieson Corp., National Tube Division of U.S. Steel Corp., Rheem Mfg. Co., and Wall Wire Products Co. He studied engineering at St. Louis and Washington universities.

Knowledge is like a torch . . .

The higher you hold it the farther it is seen.

At the Perfect Circle laboratories our constant purpose is the acquiring of knowledge of products and their installation which will improve the service an engine gives to its owner.

But we realize the mere acquisition of this knowledge would accomplish but little if we failed to pass it on to those who design, manufacture and maintain the world's motor vehicles and other internal combustion engines. Hence, our researchers freely reveal their findings to all automotive engineers and their organized associations. For those who service and maintain internal combustion engines, we periodically hold local Doctor of Motors clinics. In the field, our technical staff is always available for help and counsel.

We give of knowledge that we may receive it from others.

Perfect Circle

Piston Rings...Precision Castings...Power Service Products...Speedostat

HAGERSTOWN, INDIANA • In Canada: DON MILLS, ONTARIO • PERFECT CIRCLE INTERNATIONAL, FT. WAYNE, INDIANA

West Coast News

By James Joseph

DELIVERED to Oregon's Centennial Commission: A 75 kw 16000 series Allis-Chalmers engine and generator set, to backstop any possible power failure at the Centennial Grounds in Portland.

SOLD TO: Golden State-Foremost Dairies, Los Angeles, an OM 636 Mercedes diesel engine, 36 hp at 3000 rpm, for powering a Divco delivery van. Sale by In-Mar Co., Wilmington.

POWERING a Mack off-highway logging truck for Potlatch Forest Service, Lewiston, Idaho, is a model 21000 Allis-Chalmers 340 hp at 2000 rpm diesel. Sale by Hamilton Engine Sales, Inc., Portland, Ore.

NORTHON Harris, Walla Walla, Wash., has purchased a Cummins JT-6-B engine to repower an International LFD-192. Sale by Cummins Diesel Sales, Inc., Spokane.

DELIVERED to Puget Sound Bridge and Dredging Co., Seattle, a Waukesha 12-cylinder diesel model VLRDBM 725 hp at 1200 rpm, with Twin Disc heavy duty clutch (PTO) to drive 12-in. centrifugal dredge pump. Sale by Piston Service Inc., Seattle.

SIMPSON Lumber Co., Korbel, Calif., has taken delivery of a 21000 series Allis-Chalmers engine for installation in a Kenworth off-highway logging truck, operating in northern California.

YUKON Territory's White Pass and Yukon Railroad has purchased a 225 hp Caterpillar D342 series C industrial engine (replacing a Caterpillar D13000) for water pumping. Sale by N C Machinery Co., Seattle.

FOR the 79-ft. purse seiner *American Star*, owned by Ed and Don Hansen, Seattle, a 6-cylinder Waukesha Defender LRDBCM diesel marine engine, 335 hp at 1200 rpm with 3.04:1 ratio driving 60x48½ propeller.

INSTALLED in twin screw government tug, under construction, two new Capital model HYCE 6900 3:1 hydraulic marine and reverse gears . . by Bytown Diesel Sales, Ltd., Prince Rupert, B.C.

WEYERHAUSER Timber Co., Chehalis, Wash., has purchased a 16000 series Allis-Chalmers diesel for logging operations in a Mack off-highway rig.

MOTOR Transport Service System, Los Angeles, has purchased an NT Cummins for repowering a Kenworth rig. Sale by Cummins Service and Sales of Los Angeles.

GM 6-110 series truck replacement engine, delivered to a Chehalis, Wash. logging company, has been installed in a Mack LMSWL off-highway rig, the engine connected to existing TR-130 Mack transmission and Brown-Lipe 8031L auxiliary transmission, with differential ratio of 10.57:1. Sale by Modern Motors, Inc., Seattle.

DELIVERED: To Puget Sound Bridge and Dredging Co., Seattle, a 100 kw Waukesha industrial generator model 6WAKD for continuous operation aboard dredge being built for City of Santa Barbara, Calif.

WORKING on a water diversion tunnel project for City of Bellingham, Wash., are two 100 kw Caterpillar D342 electric sets, delivered to A. J. Cheff Construction Co.

SAN Juan (Utah) County Hospital, has purchased a Deutz fully automatic diesel-electric set A8L614, 170 hp at 2300 rpm, with Kurz & Root alternator.

FOR powering ore cars, Young Machine Co., Monticello, Utah, has purchased three Deutz engines—an F1L712, F2L712 and F4L712.

SCHNEIDER Tractor Co., Brawley, Calif., has sold to Imperial Valley rancher Clabe McDoe two Lister HA2 air-cooled engines, 22 hp at 1800 rpm, for powering Oliver 101 three-wire balers through Twin Disc clutches.

SONDGROTH Bros., Moutain View, Calif., has taken delivery of a Lister SL1Z air-cooled diesel, 4¼ hp at 1800 rpm, for powering a pump thru reduction gearing. Sale by Oswald Machine Works.

J. ODEGAARD and A. Anderson, Seattle, have taken delivery of a 2-cycle GM marine engine (model 62207RD) with 4-valve head, rated 227 hp continuous at 1800 rpm for their halibut boat *Platinum*.

TO Merrifield Trucking Co., Anaheim, Calif., a Cummins NH-220 for repowering a Kenworth for the big refrigerated hauler.

Meeting Set Sept. 21-23 for Locomotive Group

Nine sessions are scheduled for the annual meeting of the Locomotive Maintenance Officers' Assn. at Chicago's Hotel Sherman Sept. 21-23. The program will open at 10 a.m. Sept. 21 with an address by the association's president, Mr. E. V. Myers, superintendent of the mechanical department, St. Louis-Southwestern Railway. The entire afternoon Sept. 22 has been set aside for a review of the Allied Railway Supply Assn. exhibit.

Worthington Makes Two Senior Appointments

Worthington Corp. has announced two senior appointments. Mr. George F. Habach, vice president—engineering, was advanced to the newly-created post of vice president—administration. Rear Admiral (Ret.) Albert G. Mumma, formerly Chief of the Bureau of Ships, United States Navy, succeeds Habach as vice president—engineering. Habach will have full responsibility for the corporation's staff activities of comptroller, employee and public relations, engineering, manufacturing, marketing, purchasing and taxes. He joined Worthington in 1929 after his graduation from Stevens Institute of Technology. He was, successively, a development engineer, chief engineer of the centrifugal pump department and manager of engineering for the Harrison (N.J.) division. He became vice president—engineering in 1955.

Admiral Mumma was graduated from the U.S. Naval Academy in 1926 as top man in his class in both engineering and aeronautics. In 1944 he was a member of the ALSOS mission investigating German atomic bomb and naval developments. He later served with the naval technical mission in Europe.

Honeywell Appoints Three

Appointment of three men to sales positions in Minneapolis-Honeywell Regulator Company's Mid-Atlantic region has been announced. Mr. Edward J. Klein has been named regional industrial manager with headquarters in Philadelphia; Mr. John J. Horner succeeds Klein as industrial manager of the Philadelphia branch office; and Mr. Carl F. Boehnlein has been assigned as industrial manager of the Richmond, (Va.) branch office.

HERE'S WHY *Fulflo* FILTERS REDUCE ENGINE WEAR

Only Fulflo Filters have genuine Honeycomb Filter Tubes, engineered to provide true *depth* filtration — even down to 1 micron! They provide substantial savings by reducing the amount of sludge content and helping to prevent wear on cylinders and bearings.

Every drop of lube oil is filtered again and again through hundreds of filtering films. Contaminants are trapped in inner storage cells, preventing surface blinding and giving unequalled tube life.

Fulflo Filters are designed for both diesel fuel and lube oil. They are available in a variety of sizes employing from 1 to 270 Honeycomb Filter Tubes for flow rates up to 1350 gpm or higher.

Write for literature to Department DS

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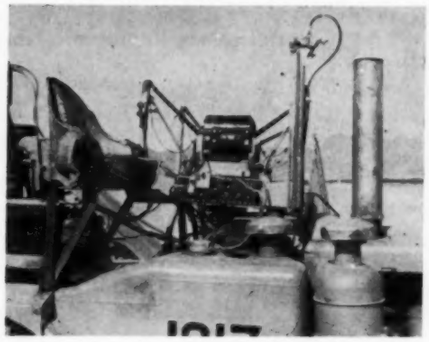
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

Advanced Instrumentation Project Completed by AiResearch, Caterpillar

An advanced instrumentation project, recording turbocharger/diesel engine operational information previously unobtainable, was successfully completed by The Garrett Corporation's AiResearch Industrial Division and Caterpillar Tractor Co. The program was carried out under actual field conditions at Caterpillar's Arizona proving grounds. An extremely sensitive recording oscillograph, mounted with soft suspension on the vehicle itself, recorded refined performance data from AiResearch model T14 and T15 model turbocharger installations on a Cat DW21 tractor—No.

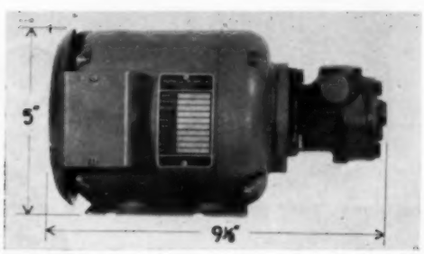


Oscillograph mounted on Cat DW21.

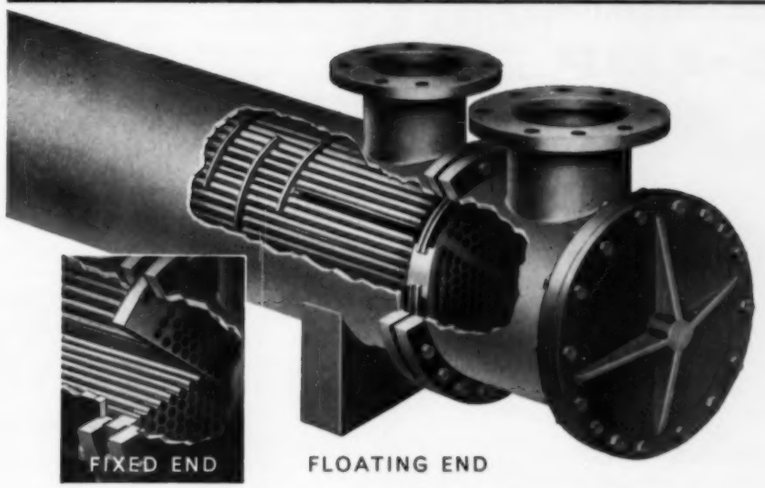
470 scraper. AiResearch and Caterpillar engineers were assisted by instrumentation laboratory personnel from Garrett's AiResearch Manufacturing Divisions of Los Angeles and Phoenix. Garrett reported that data acquired in turbocharger/diesel engine matching, turbocharger response and performance and operating technique of the vehicle driver, far surpassed that normally derived from static test stands or the less sensitive instrumentation normally used in rugged operational testing. The numerous operations "tapped" for information included turbocharger rpm, manifold pressures and temperatures, positions of the exhaust bypass valve and the control pressures operating it. Recorded from the diesel engine itself were fuel pressures, engine rpm and movements and positions of the gear shift and throttle.

Tuthill Pump and Motor

The Tuthill Pump Co., Chicago, recently announced the addition of a new "Series 42" pump and motor combination to its line. Developed specifically for applications where space and weight are at a premium, the new unit measures only 9⅛ in. x 5 in. It incorporates a totally enclosed electric motor rated for 1/12 to ⅙ hp, and a Tuthill internal gear pump with a capacity of from ⅓ to 3 gpm. The series has 24 models. (ITS NEW)



PERFORMANCE THAT CREATES SATISFACTION!



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HEAT TRANSFER DIVISION

Yates-American

MACHINE COMPANY

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Mid-West Diesel News

By L. H. Houck

SANTA Fe System Lines has added 69 new diesel freight locomotives, making a total for this railroad of 1910 diesel locomotive units more than 2,600,000 hp. The new units were built by the American Locomotive Co. and the Electro-Motive Division of General Motors.

VICTOR L. Phillips Co., equipment dealer for such lines as Ingersoll-Rand, Unit, Rex and Cleveland Trencher, is leaving the site it occupied for 34 years for new and greatly enlarged facilities at 4100 Gardner in Kansas City.

McLEAN Construction Co., Springfield, Mo., recently put a 34-E Rex mixer and paver in service. Engine is a 4-71 GM Diesel.

WORKING on Navajo Dam, near Aztec, N.M., is a Ferguson compactor which uses four sheepsfoot rollers, each driven by a separate engine through a separate torque converter. Engines are 4-71 GM Diesels; torque converters are Allison.

CHILES Machinery & Equipment Co., Springfield, Mo., recently delivered two Model 160 Allis-Chalmers motor scrapers, three HD-16 A-C tractors, two with Twin Dsic converters and one with straight transmission, and two HD-11 dozers to Reeves Construction Co., Columbus, Kan. Three pieces of equipment had hydraulic rippers.

INLAND GM Diesel's Ralph Laubusch and Leo Scnab, Milwaukee, have qualified for membership in the GM Diesel Craftsman's Guild, a national organization recently established to recognize and encourage expert workmanship in servicing GM Diesel industrial and marine engines. They passed examinations given by GM field service engineers in Chicago.

GILLOIZ Construction Co., Monett, Mo., has purchased two Allis-Chalmers HD-16's with straight transmissions from Chiles, A-C dealer in Springfield. One was equipped with a hydraulic ripper.

POWER Equipment Co., Denver, Allis-Chalmers dealer recently moved to new and enlarged facilities at 500 E. 62nd Ave., Denver. It handles the complete construction equipment line of Allis-Chalmers.

MAXWELL Bridge Co., Columbus, Kan., put a new Koehring crane with 80 ft. boom to work on Interstate 70 near Columbia, Mo. Engine is a Caterpillar diesel.

INLAND Diesel, Inc., Milwaukee, delivered a 6-71 GM Diesel engine to Merle Bacon, Hancock, Wis., for use on an irrigation system.

OLIVER Mining Co., has purchased a Deutz A2L-514 air-cooled diesel for a drill rig engaged in drilling operations in Minnesota.

REX Engineering Corp., Baltimore, has designed and built a pile driver for M. G. Imbach, Inc., which incorporates a Deutz F1L-712 engine and an Atlas Copco 47 cfm. air-compressor.

NATIONAL Equipment Supplies, U.S. 66 at Springfield, Ill., has been appointed a distributor for the full line of crawler and wheel dieselized tractors of the Oliver line.

McLEAN Construction Co., Springfield, Mo., has three Bucyrus-Erie 22-B's with 4-71 GM Diesel engines working on its Chestnut Street Trafficway job in downtown Springfield. Delivery was made through Machinery, Inc., Kansas City which recently established a branch in Springfield.

CLARKSON Construction Co., Kansas City, put a new American transit crane with 4-71 GM Diesel engine to work on its Highway 40 job near Columbia, Mo.

TWO Model 45 Allis-Chalmers graders, one model 145 A-C grader, one HD-6-G Allis-Chalmers loader have been delivered to Francis Reeves, Columbus, Kan.

CRAWFORD County Highway Dept., Gays Mills, Wis., has taken delivery of a new GM Diesel 4-71 engine to repower a 703 Oskosh heavy duty truck.

MATCHED pair GM diesels, Models 6071A and 6072A, have been delivered to Burger Boat Co., Manitowoc, Wis., by Inland GM Diesel. Burger builds pleasure boats and will use the new diesels to power a new motor-sailer.

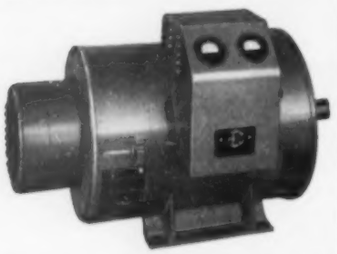
Western Gear Representative

Western Gear Corp., Los Angeles, Calif., has appointed Elmer B. Fogelson Co., Davenport, Iowa, as its representative for StraitLine gearmotors and speed reducers and Speed-Master reducers and high speed units.

Power on tap!

A NEW 5 TO 50 KW "PACKAGED" GENERATOR

REG-AMP



REG-AMPS are available for 1800 and 1200 rpm operation, single- or 3-phase power, at all standard low voltages. REG-AMP shown has single bearing. Two bearing units are also offered.

It's a complete source of a-c electric power and the perfect mate for your engine

REG-AMP is a revolving field a-c generator with direct-connected exciter, built-in automatic voltage regulator, and a-c ammeter and voltmeter. It's factory assembled, internally connected, and tested.

Regulates voltage automatically. Simple relay constantly senses output voltage and keeps it right for best operation of your motors, lights, and electronic equipment.

Positive voltage control. Voltage can be adjusted to compensate for line voltage drop or normal engine speed droop under heavy load.

Starts big motors fast! Coordinated regulator design gives quick response.

Easy to install, simple to operate. Fully self-contained. Requires no switchboard. Merely couple to engine and connect to load thru suitable switch.

Needs little maintenance. Only an occasional check for cleanliness and brush wear.

Fabricated steel frame. Rigid, dripproof frame keeps REG-AMP safe, clean, and dry.

Performs smoothly. Every design is painstakingly engineered. REG-AMP is a product of 50 years of E-M Generator experience.

Get more information from your nearby E-M Sales Engineer. Also, write E-M for publication PRD-246 . . . it gives complete REG-AMP ratings.

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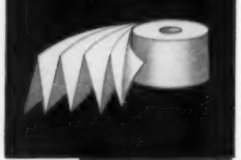

Unique spiral paper construction provides 560 square inches filtering area.

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YOU CAN DEPEND ON THE DIESEL THAT DEPENDS ON ROOSA MASTER

Inland River Reports

By A. D. Burroughs

PRETTY newcomer to the chemical traffic for Mid-South Chemical Co. is the new all-steel towboat, *Jill Wasson*. De livered by Marine Welding and Repair Co., Greenville, Miss., the 66 x 24 ft. vessel carries two 290 hp Caterpillar engines for main push power.

CONTINUED interest in 3200 hp towboats is evident with the early fall launching of the 130 x 37 ft. towboat built by Superior Boat Works, Greenville, Miss. The air-conditioned craft has two GM Cleveland diesel engines.

AMERICAN Marine Corp., New Orleans, turned out the new compact towboat in service for owner Belcher Towing Co., Miami, Fla. Named the *Virginia B*, the 64 x 20 ft. vessel has two Caterpillar D353 Series C engines for a total of 600 hp.

LUNNY Theriot, Chauvin, La., delivered the new towboat, *Floyd Jr.*, to owners B. B. Boat Co., Amelia, La. Brady Engine Co., Berwick, La., supplied the two main engines, GM Diesel model 6071E, while Arthur Duvic, Inc., New Orleans supplied Lister generators.

TWO turbocharged White Atlas engines, each rated at 300 hp, power the last of the three push-type towboats completed for the Argentina government by the Products Division of Todd Shipyards Corp., Houston. The 70 x 20 ft. vessel is scheduled for service on the Parana River in South America.

FROM college to commercial ownership is the call for the frequently spotted *Suffolk*. Built in 1951, the GM-1800 hp towboat has been purchased from Baylor University by Hamilton Marine Corp., New Orleans. The craft has been under charter to Canal Barge Co.

TUTT Towing Co., Mobile, Ala., announced the purchase of the towboat *Willie B.* for action on the Alabama-Warrier rivers. Previously owned by Clifton Towing Co., Paducah, Ky., subsidiary of the Crounse Corp., the 11-year-old vessel has 660 hp delivered from GM Diesel engines.

EAST Wind, 19-year-old hawser tug, owned by Massman Construction Co., Kansas City, Mo., has new power with the installation of a Cummins Model V-12-M engine rated 425 hp at 1850 rpm. Cummins Missouri Sales Corp. supplied the engine, with Barbour Metal Boat Works, St. Louis, handling installation.

LADY Linda, the 116 x 30 ft. towboat built by St. Louis Shipbuilding & Steel Co., in 1951, has been chartered for service by Walter G. Hougland, Inc., Paducah, Ky. Owned by Inland Oil & Transport Co., St. Louis, the vessel has 1800 hp delivered from GM Diesel 12-567 engines.

BAYOU LaRose is reportedly the new name for the active *Susan Hougland*. Oil Transport Co., New Orleans, has purchased the 1949-built towboat from the Walter G. Hougland firm. A total of 3000 hp is developed from a pair of GM diesel engines.

ILLINOIS Waterway traffic was heavy, as we watched the *Larry Turner* upbound with a sizeable oil tow. Specially built in 1956 for this waterway by St. Louis Shipbuilding and Steel Co. for Hutchinson Barge Lines, the 1800 hp comes from two GM Diesel engines.

CINDY Jo was out on the Illinois, turning in fine performance with the 1600 hp supplied by the two White Superior engines. The 3-year-old towboat, built by Calumet Shipyard, operates for Rose Barge Lines, Marseilles, Ill.

THE Southern towboat, *Joey*, made a rare appearance on the upper Ohio River. Built in 1956 by Bryant Boats, Inc., Alabama, the 60 x 20 ft. craft has a rated 800 hp from two Allis-Chalmers engines.

Automatic Controls Described

Control systems for completely automatic operation and protection of gas-engine compressors are described in a new flier released by Ingersoll-Rand. The flier describes I-R's Tendamatic control, and shows how it is applied to engine-compressors for gas transmission and distribution, oil and gas field services, refineries, chemical and industrial plants and other compressor applications. Also shown are Tendamatic control systems for I-R electric-driven compressors on special services, as well as the Airpower Tendamatic control for 100-psi air compressors. A typical Tendamatic-controlled engine-compressor installation is described, listing the functions that can be performed. These include automatically-timed steps for starting procedure, speed and capacity regulation, constant guarding of the unit against any malfunction, normal shutdown control and sequence control. Tendamatic warns the operator if an abnormal condition should occur. When any condition reaches a danger point, Tendamatic sounds a horn and flashes a red light which locates the trouble and shuts the unit down. Also described is a radio-controlled I-R engine-compressor in an unmanned, isolated gas distribution station. The compressor is controlled by a Tendamatic system, and operating conditions are telemetered to a downtown office by microwave. For more information, write Ingersoll-Rand, 11 Broadway, New York 4, N. Y.

ITS NEW

Enterprise Appoints Manager

Mr. Walter Hansen has been appointed manager of the Seattle branch of Enterprise Engine & Machinery Co. Mr. William H. M. Porter, Enterprise representative in Seattle for more than 25 years, retired as branch manager, but will serve as engineering and sales consultant. Hansen has been an Enterprise service engineer for 20 years. He worked with Mr. A. C. Estap in the design of the Estap engine.

ONE source, one responsibility for all cooling requirements is the sensible approach to solving heat transfer problems. By using one reliable source, you automatically solve problems of service, and there is never a question of responsibility for performance. Young's wide range of products and over 30 years experience in designing, engineering and manufacturing heat transfer equipment for the diesel field qualifies them as the most logical source for all your cooling needs. Let us show you what undivided responsibility can mean in the way of economy, quality control and efficiency of performance. Write, wire or call without obligation.

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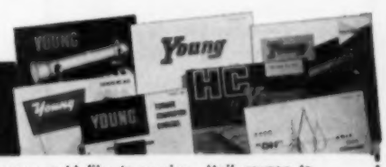
Acquaint yourself with Young's wide range of products for the diesel industry.



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☐ Cat. No. 557 — Horizontal Core Air Cooled Heat Exchangers
☐ Cat. No. 1258 and No. 1156 — Shell and Tube Heat Exchangers
☐ Cat. No. 1054A — Young Torque Converter Coolers
☐ Cat. No. 3558 — Type 'OH' Unit Oil Coolers

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Electro-Motive Promotes

Organizational changes announced recently by Mr. Victor E. Rennix, general sales manager of Electro-Motive Division of General Motors, included: Eastern Region—Messrs. B. K. Wingerter, A. K. Auburn, and W. A. Stringer, formerly district sales managers, promoted to district managers—railroad district; Chicago Region—Messrs. A. E. Roberts, P. C. Ganzar, N. A. Minor, and A. J. Marcussen, promoted to district managers—railroad district, from district sales representatives. Mr. W. A. Thomas, former district sales manager, is now district manager—railroad district; St. Louis Region—Messrs. G. B. Gowen and R. E. Hill, promoted to district managers—railroad district from district sales representatives. Mr. J. E. O'Leary, former district sales manager, is now district manager—railroad district. Mr. Kenneth J. Wolf, former manager of the sales engineering section, was appointed manager of the product application section of the sales department. Mr. Warren A. Fox, former supervisor of the sales engineering section, has succeeded Wolf as sales engineering section manager.

Jack Ogle & Co. To Represent Parker-Hannifin Corp.

Franchisement of Jack Ogle & Co. as a distributor for Parker industrial tube and hose fittings and hydraulic accumulators is announced by D. A. Cameron, general sales manager-distributors, Parker-Hannifin Corporation, Cleveland, Ohio. Jack Ogle & Co., with offices at 105 Orcas St., Seattle 8, Wash., and 2505 S. E. 11th Ave., Portland 2, Ore., will carry extensive stocks to assure prompt handling of customer requirements. The firm has represented Hannifin Company, a division of Parker-Hannifin Corporation, since 1950. Direct factory assistance will be available from Norm G. Burkhardt, Parker-Hannifin district manager of distributor sales for the Northwest.

Bristol Issues Bulletin

The Bristol Co. has released a new edition of Bulletin E-1111, "Recording Voltmeters and Ammeters." The bulletin describes one, two, and three-pen instruments in wall-mounting, panel-mounting, portable and pole-mounting models. A compact portable model developed especially for public utility use is featured. Operating principles are explained, and models are described in detail. The bulletin includes a list of charts and accessories for use with the instruments. Write to The Bristol Company, Waterbury 20, Conn. (ITS NEW)

Gulf Issues Mining Lubricant Book

Gulf Mining Lubricants is the title of a new illustrated booklet published by Gulf Oil Corp. to familiarize the mining industry with the full line of Gulf greases and oils especially developed for this industry. Featured in the eight-page pamphlet is new Gulf mining lubricant H.D., a semi-fluid lubricant with rugged resistance to water, extreme pressures and high temperatures. Included in the booklet is a detailed review of the characteristics of Gulf mining lubricant B, designed for use on nearly every type of equipment used in non-continuous mining operations. Other products described are Gulf Harmony Oil for hydraulic systems; Gulf Supreme Grease No. 1 for bearings operating in moist atmospheres; and Gulf Lubcote, used in service applications to protect open gears, cables, drag lines and above-ground equipment against wear and corrosion. Also listed are Gulf fuels, oils and greases that can be specified for a variety of stationary and motorized equipment used in both metallic and non-metallic mining operations. The booklet may be obtained by writing Gulf Oil Corp., Department DM, Gulf Building, Pittsburgh 30, Pa.

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Pump Catalog Available

Allis-Chalmers' new "Pic-A-Pump" catalog contains 576 pages of engineering data arranged for convenient selection of pumping units and materials of construction to meet specific applications. Hundreds of pump types, models and sizes, with capacities covering almost any head conditions, are carried, along with list prices. Requests are limited to those made on company letterheads submitted to Allis-Chalmers Mfg. Co., Industries Divisions, Milwaukee 1, Wis.

Lightweight Expansion Joint

A lightweight, high temperature, low pressure service expansion joint is now being manufactured by KA-CY Mfg. Co., Inc., Houston, Texas. Designed for temperatures up to 1200 F., KA-CY expansion joints are especially recommended for use on turbocharged and other large engine exhaust lines where the back thrust of the exhaust line presents costly, time-consuming maintenance due to thermal expansion. The expansion joint embodies a packed slip joint which has a stainless steel packing surface. The mounting base and adjustable centering roller support are an integral part of the unit and remove the weight of the slip joint from the surrounding packing and gland. Packing is uniformly compressed through the full 360 degrees of the slip joint and wears evenly at all points. KA-CY expansion joints require no precompression and will not take a permanent set. The units have a 3 in. traverse with 20-in. face to face maximum. End thrust is minimized and constant throughout the traverse. The manufacturer claims that the design of the unit eliminates metal fatigue resulting from axial pulsation or intermittent service. The flanged 30-in. KA-CY expansion joint weighs 600 pounds. The unit is rotatable.

Reo Announces New Transmission

The Allison fully automatic truck transmission is now available in Reo trucks and tractors, the Reo Division of The White Motor Co. has announced. "ReoMatic" is the name selected for the transmission for medium and heavy duty vehicles. It is matched to the OH170, OH-185 and OV235 engines. ReoMatic incorporates a torque converter, constant mesh planetary gearing, hydraulic control system, hydraulic retarder and converter-driven power take-off positions. The converter delivers its greatest amount of power from a starting position and absorbs shock loads and automatically locks up in every forward gear after furnishing the required increase in power.

Book Reviews Corrosion In Boilers, Gas Turbines

Factors that cause destruction of boilers and gas turbines are comprehensively reviewed and summarized in a new publication by The American Society of Mechanical Engineers. Called "Corrosion and Deposits in Boilers and Gas Turbines", the report is designed to provide an up-to-date survey of all available knowledge in the field. Lists of references at the end of each chapter provide an extensive bibliography of published works. Private reports from British and American associations and questionnaires answered by manufacturing firms were also utilized in the preparation of the 198-page review.

The book has seven chapters, including discussions of mineral constituents in coal and heavy fuel oil, and their behavior during combustion; sulfur oxides; physical aspects of deposition; origin and composition of deposits and methods of minimizing them; high temperature corrosion effects and metallic corrosion from gases below 400°F; and removal of solids from combustion gases. Areas of limited knowledge are indicated and references made to directions of further research. Battelle Memorial Institute prepared the report under contract to the Society's research committee on corrosion and deposits from combustion gases. "Combustion and Deposits in Boilers and Gas Turbines" is available, at $6 per copy, from the Order Department, ASME, 29 W. 39th St. New York 18, N.Y. (ITS NEW)

Mechanical Indicator Filters

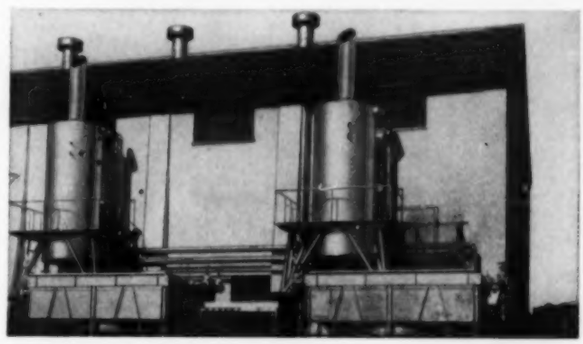
High or low flow filters with a new mechanical indicator to provide a differential pressure signal when cleaning is required have been announced by Purolator Products, Inc. Capable of withstanding full-line pressure (4500 psi) and operable under extreme temperature conditions, the new mechanical indicator filters can be used for any fluid system in which differential pressure may be used for measurement. The new indicator filters employ a non-magnetic, pressure-sensitive piston which, when actuated by changes in differential pressure across the filtering element, transmits linear motion to an indicating mechanism which then releases a visual button.

Manual reset is accomplished by depressing the indicator button until it automatically engages a detent, and remains in a hidden position. The new indicator filters can be designed with or without relief valves and bypass arrangements. Because the pressure-sensitive piston operates independently of flow, the indicator filter can be made for practically all sizes and operating conditions. To prevent a low temperature actuation of the indicator as a result of high differential pressure caused by high viscosity, a specially-designed "thermal-lock" is included in some models. When operating temperature falls below the set limit, a bimetallic collar contracts to prevent the indicator button from operating. Presently, filters in design are temperature locked at minus 30° F.

Filtering elements in the new indicator filters can be constructed from most any type of filter media, including woven wire cloth, porous metal, and Micronic® paper media. Housings are available in all-aluminum or stainless steel construction. Depending on the filtering media used, degree of filtration for the new indicator filters ranges from 5 to 50 microns; units now in production meet all indicator requirements for proposed MIL. SPEC. MIL-F-8815. For further information, write Purolator Products, Inc., Rahway, N. J.

Cummins Diesel International Names Managing Director

Appointment of Mr. W. A. Reeks as managing director of Cummins Diesel International Ltd. has been announced by Reece Hatchitt, director of international operations of Cummins Engine Co., Inc., Columbus, Ind. Reeks will be stationed at the company's international headquarters in Nassau, The Bahama Islands. He will direct a Cummins staff of world trade specialists, including regional managers, sales and service representatives, market development and administrative personnel. Reeks joins Cummins Diesel International Ltd. after more than 25 years' service with Curtiss-Wright Corp. He has specialized in international sales; his previous duties included the direction of overseas factory construction and the supervision of a large sales and service staff. He has resided in England, Argentina, Brazil and France and has frequently visited many other countries.



MAXIM silencers help Florida power plant reduce costs

The New Smyrna Beach municipal power plant has two new 2500 HP Enterprise Turbocharged Diesels. They burn heavy, low-cost residual fuel at a considerable saving. However, this fuel requires pre-heating. Maxim Heat Recovery Silencers efficiently capture waste heat from the diesel exhausts and pre-heat the fuel—at virtually no operating cost.

Maxim Heat Recovery Silencers provide the optimum in noise suppression—residential degree silencing. They can be run wet or dry, permitting continuous use of engines even if the need for waste heat is intermittent.

Maxim offers vertical and horizontal models for a wide range of conditions and capacities—the most complete line available. Write for full information.

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Flexonics Names Western Region Manager

Mr. Robert G. Arnold has been appointed Western Region Manager of Flexonics Corp. according to an announcement made by Thomas K. Wells, vice president and general sales manager. Mr. Arnold replaces Mr. George W. Derum who has resigned. Mr. Arnold has been Central Region Manager with headquarters in Detroit, Mich. since that office was established. He has been with Flexonics since 1951 starting as a sales coordinator for aeronautical products, progressed to field sales engineer then assistant sales manager of automotive replacement before becoming central region manager in 1957. Mr. Arnold is a graduate of Loyola University in Chicago where he specialized in Marketing. Flexonics' Western Region Office is located at the company's newest plant, 3324 W. Delhi Rd., Santa Ana, Calif.

Corrosion Inhibitor Announced

A United States patent has been issued to Hagan Chemicals & Controls, Inc., for a new chemical compound which inhibits corrosion in closed recirculating water systems, with or without antifreeze. Called Corrosion Inhibitor CS, the non-chromate product will protect steel and other metals such as copper, brass, aluminum and solder. The manufacturer field tested the product for four years and claims that it is effective in preventing corrosion in air conditioning systems, diesel and gas engines, compressors, process cooling water systems, rectifier cooling systems, hot water boilers, ice melting and heat pump systems. Corrosion Inhibitor CS will not stain nor cause dermatitis, Hagan says. It requires little checking during standby because oxygen in-leakage does not affect its action. For literature or details, write Hagan Chemicals & Controls, Inc., Box 1346, Pittsburgh, Pa. (ITS NEW)

Johnson Named Manager of C-B New York Office

Appointment of Mr. Roy W. P. Johnson to the post of New York district manager has been announced by Mr. George W. Edick, sales manager, domestic division of The Cooper-Bessemer Corp. Johnson assumes the position vacated by Mr. Charles M. Reagle, who retired after 35 years of service with Cooper-Bessemer. Johnson is a graduate of Kingston-on-Thames Technical College. He joined Cooper-Bessemer in 1950, after having taught at the University of Toronto. He previously had been employed by the Andian National Corp. in Columbia. Cooper-Bessemer has appointed Mr. Harold G. Blassey to its New York domestic branch office. He is a graduate of the University of Michigan, Ann Arbor.

Receives Military Contracts

American Marc Inc. has received several military and commercial contracts totaling more than $1,600,000, President Denis Kendall announced recently. The new contracts included: production orders in excess of $1,130,000 for the company's line of diesel engines, generators and generator sets; research and development contracts of approximately $470,000 for new products to be offered in the near future. In addition, the company is currently negotiating large contracts which, if consummated, could be scheduled for production within 60 to 90 days.

Onan Appoints Auger as Sales Promotion Manager

Mr. William J. Auger, Minneapolis, Minn., has been named sales promotion manager of D. W. Onan & Sons Inc., Minneapolis. The move was made to provide more active assistance to the Onan field sales organization, said Roy E. Mullin, general sales manager. Advertising and sales promotion, formerly combined in one department, will be separated into individual departments because of a planned increase in both activities. Mr. George Burda, who formerly headed the combined departments, will continue to direct and administer all of the operations for which he had been responsible at the Onan factory. His new title is advertising manager. Auger had been sales manager of a large automotive manufacturing company for the last four years.

AiResearch Unveils Jet Powered Wheelbarrow

What probably was the world's first jet powered wheelbarrow was unveiled in Paris during the summer. The unique addition to the jet age was made by the AiResearch Mfg. Co., producer of small jet engines. AiResearch explained that the wheelbarrow mounting probably would be a single item. The wheelbarrow unit was to tour Europe with the Vertol 107 helicopter, supplying power to start the 107's twin turbines. Later versions of the 30 hp turbine will be offered as optional built-in equipment to purchasers of Vertol's cargo-passenger craft. The little turbine supplies shaft power to a generator also mounted in the wheelbarrow. This handy source of electricity was to provide all power needed to start the Vertol copter during its 90-day tour of Europe.

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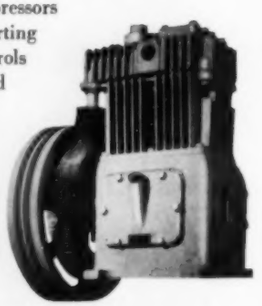
Naturals for marine duty, Quincy Compressors deliver the performance needed for starting and operating clutches, signals and controls as well. Models to 90 C.F.M. Authorized service stations from coast to coast.



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Aeroquip Will Expand

Aeroquip Corp., Jackson, Mich., recently announced that a record $2,400,000 capital expenditure program, providing a total of 140,000 square feet of working area, was scheduled for the next 18 months. President Peter F. Hurst said that the six major projects included in this expansion program were: A new and larger plant for the Elbeeco Division in Jackson; an extension to the Jackson Division plant; a plant addition to the Industrial Division in Van Wert, Ohio; new production facilities at the Western Division in Burbank, Calif.; A new engineering center for the Marman Division in Los Angeles, Calif.; and a special laboratory for testing Aeroquip products used on rockets, missiles, and other advanced applications to be operated by the engineering center.

Hurst said that a substantial increase in the backlog of orders, particularly from industrial markets, made expansion necessary. Aeroquip produces flexible hose assemblies, detachable, reusable fittings, self-sealing couplings, clamps, straps, bands, load control and cargo tie-down equipment for aircraft, industrial, farm, marine and railroad use.

Appointment of eight new industrial distributors has been announced by M. Lloyd Jones, Aeroquip's manager of distributor sales. They are: Dixie Engine Co., Atlanta, Ga.; Auto Parts & Electric Co., Statesville, N.C.; Bearing Chain & Supply Co., Dallas, Tex.; Gas Supply Company, Minneapolis, Minn.; Cummins Diesel Sales Corp., Hialeah, Fla.; Bloomington Battery Service Co., Bloomington, Ill.; Tasco Products, Inc., Geneva, Ill.; and Cummins Diesel Sales Corp., Jacksonville 1, Fla.

Berwick Adds 3200 SHP Towboat

The fourth Dravo-3200 towboat has been purchased by Berwick Bay Towing Co., an affiliate of the Chotin Transportation Co., of New Orleans, one of the largest bulk liquid carriers on the inland waterways. The new vessel, which will be 148 ft. long, 34 ft. wide and 10 ft. 6 in. deep, will be powered by two General Motors Cleveland diesel marine engines with a combined 3200 shp. She will be equipped with the most modern navigation aids, including radar and ship-to-shore telephone. Other features will include reverse reduction gears and hydraulic steering controls. In operation, the Dravo-3200 class has proved one of the fastest and most efficient on the rivers. Scientific design of the hull, rudders and Kort nozzles, was developed as the result of Dravo's continuing program of research and model basin testing. The 3200 can push either maximum tonnage tows or streamlined, high-speed tows with equal efficiency. The new boat will be the most powerful in the Berwick Bay fleet, which also includes the 2000 hp *Linda Chotin* and the 1800 hp *J. B. Chauvin*. Berwick Bay operates on the Mississippi, Ohio and Monongahela rivers.

New Dodge Transmission Digest

A brief, comprehensive review of the Dodge line of power transmission machinery is presented in a new eight-page bulletin. Featuring Flexidyne dry fluid drives and Para-flex flexible cushion couplings, two of the newest products in the line, the bulletin also has illustrated discriptions of such products as steel conveyor pulleys, roller chain drives, various types of shaft couplings, and the new Dyna-V line of V-belt drives. Other products included are pillow blocks with tapered roller bearings, spherical roller bearings, ball bearings and sleeve bearings, takeups, friction clutches, torque-arm speed reducers and screw conveyor drives. Ask for Bulletin A-706, Dodge Mfg. Co., Mishawaka, Ind.

Bruckner Heads Distributorship

Appointment of M. J. Bruckner to the position of manager of the Cummins Diesel Sales Corp. distributorship in Peoria, Ill., has been announced by C. H. Kring, assistant manager of Cummins Diesel Sales Corp. Mr. Bruckner joined Cummins in August of 1957 and served as technical data coordinator and administrative assistant to the vice president—sales prior to his new appointment. He graduated in 1953 from Purdue University where he majored in mechanical engineering. Later he attended Stanford University where he received his masters from the Graduate School of Business in June of 1957. As manager of the distributorship in Peoria, he will head Cummins' sales and service organization in that area. He succeeds L. J. Obert as manager of the Peoria distributorship.

White Driver's Manual Ready

The latest edition of the White Driver's Manual for truck owners, fleet superintendents, and drivers now is available. The 158-page manual, a compilation of motor truck data designed to help the truck driver conserve his equipment and keep it operative, is based on the experience of thousands of drivers, factory and field engineers, fleet supervisors and other motor truck authorities. It was compiled with the aid of a nationwide study of drivers' problems and their solutions. Contents include sections on correct preparation, starting, taking-off, road practices, parking and care, plus reference data on cooling system capacities, electrical accessory loads, weights of commodities, among other things. Several pages on which the driver can keep special information about his own vehicle for easy reference while on the road are included. The 5⅛ by 7¾-in. manual is available for $1.25, actual cost of production, by writing to sales promotion department, The White Motor Co., 842 E. 79th St., Cleveland 1, Ohio. (ITS NEW)

Clark Names Deer as Sales Engineer

Appointment of Mr. Z. B. Deer, Jr., as sales engineer for Clark Bros. Co. in the Texas-Oklahoma panhandle area has been announced by Mr. George W. Probst, Clark vice-president—sales. Deer will be responsible for the sale of Clark engines, compressors and gas turbines throughout the northern half of New Mexico, the Oklahoma and Texas panhandles, plus the Liberal (Kan.) area. He formerly was chemical division supervisor with the Celenese Corp. His headquarters will be in Pampa, Texas.

American Air Filter Honored by AIM

American Air Filter Co. has been honored for its high level of management. The American Institute of Management has certified AAF as "Excellently Managed" during 1958. The award was made by Jackson Martindell, chairman of the Board of the non-profit Institute, to "bring deserved recognition to those companies whose managements are doing most to increase productivity, with accompanying benefits to employees, shareholders, their plant communities and the economy as a whole". The ten factors employed in auditing a management included: economic function, corporate structure, health of earnings, service to stockowners, directorate analysis, research and development, fiscal policies, production efficiency, sales vigor and executive evaluation.

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New Fluid/Gas Filter Series Handles Pressures to 1000 PSI

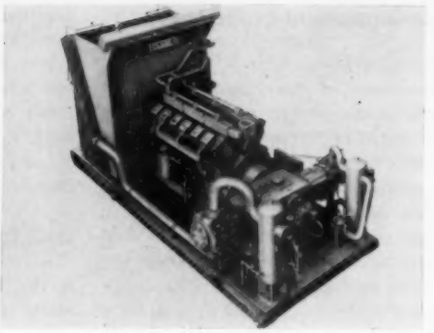
New high pressure filters capable of operating at pressures to 1000 psi and temperatures to 275° F. have been introduced by Purolator Products, Inc. The new filters—designated the P-192 series—are

for use in pneumatic and hydraulic systems. They provide effective filtration for such fluids as lubricating oils, ethylene glycol mixtures, hydraulic fluids (including mineral oil base, silicate esters, and diester oil base), fuel and oils, plus air and gases. Any model in the new series can be adapted for filtration of many other types of fluids by changing to the proper gasket material.

Design of the P-192 series permits use of replaceable paper elements, wire mesh, or varied-spacing metal-edge filtering media with degrees of filtration ranging from 2 to 25 microns. Clamp lock-ring construction on the steel housing affords easy element change and replacement without disconnecting the filter from the circuit. All units in the series are furnished with mounting brackets, inlet and outlet connections and internal relief valves. Relief valve settings vary from 15-20 psi for lower differential pressures to 45-55 psi for higher pressures. For suction side installations, 4-6 psi settings are available. For additional information about the P-192 series, write to Purolator Products, Inc., Rahway, N.J. (ITS NEW)

Clark Adds Larger Capacity Packaged Field Compressor

A new addition to its line of packaged compressors for gas and oil field applications has been announced by Clark Bros. Co., one of the Dresser Industries. Designated the Model CFB, this unit features a 5 in. stroke, two-cylinder, balanced/opposed compressor built in sizes ranging from 200 to 350 bhp. Similar to the Clark Model CFA field compressors, the CFB is designed for single or two-stage applications where greater capacity is required in a two-cylinder machine. The case and running gear are extra heavy throughout to accommodate up to double the horsepower of a Clark CFA-2.



A completely self-contained compressor station, the Clark CFB can be used for gas lifting, gas boosting, repressuring, pressure maintenance, field gas gathering, and pipeline testing. Operating at 1000 rpm, the unit is directly connected to the driving engine by a simple rubber block type coupling. Belt and gear drives are eliminated. Balanced/opposed compressor design virtually eliminates vibration, permitting the compressor package to be mounted on any support that will hold its weight.

The CFB is built with a single unitized vertical air flow radiator that cools both engine and compressor. All components—engine, compressor, radiator, scrubbers and other necessary auxiliaries—are mounted on a rigid steel skid. The CFB is shipped as complete unit. No assembly is required at job site. Detailed information and specifications can be obtained by requesting new illustrated Bulletin 171 from Clark Bros. Co., Olean, N. Y. (ITS NEW)

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Put more sense in your lubrication dollars—with a Manzel Force Feed Lubricator. Outstanding Vacuum Pumping Units cut maintenance cost, increase accuracy, solve liquid sight feed problems. See your Manzel field engineer.
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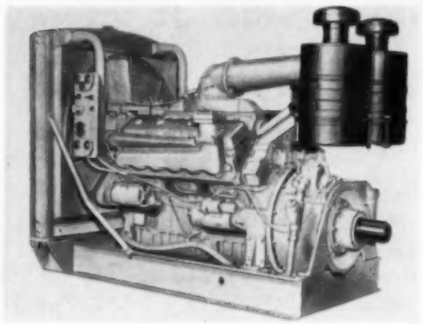
GM Diesel Shows Its New V-Type Engines

Diesel engines in smaller, more portable packages for oilfield equipment were displayed by GM Diesel at the International Petroleum Exposition in Tulsa, Okla., in May. GM Diesel's newly expanded all-purpose power line includes more than 250 V and in-line models in three series of engines ranging from 20 to 1650 hp. Representative of the firm's new V-type engines is a 24-cylinder series 71



New 12-cylinder GM Diesel series 71 engine

multiple unit with a basic engine rating of 1008 hp. This model consists of two 12-cylinder V units mounted side by side on a common base driving a single output shaft. It is 108 in. long, 72 in. wide and 91 in. high. Complete with radiator and base, the unit weighs 12,900 lbs. The unit of highest horsepower in the expanded line is a twin 16V-

Shown at the Petroleum Exposition, this Cardwell servicing rig is powered by 12107 GM Diesel engine with Allison torque converter. From left are: Mr. Jim Flemmons, Cardwell Mfg. Co. of Wichita; Mr. Ray E. Christian, Chris Well Servicing Co., Ltd., Lindsay, Okla.; and Mr. J. T. Tucker, Cardwell general sales manager.

71 which, when turbocharged, has a top rating of 1650 HP.

At the lower end of the horsepower range, GM Diesel exhibited a 13 to 24 kw generator set driven by a two-cylinder engine in a new series called the 53. These engines, ranging from 20 to 195 hp, form a smaller version of the series 71 line. GM Diesel's expanded line includes all previous series 71 and 110 in-line models, four new V-type engines in the 71 series and four V and in-line engines in the new 53 series. The line includes models adaptable for all types of drilling equipment: exploratory, servicing and work-over rigs; utility units; crew boats; pipe line construction and pumping equipment, as well as on and off-the-highway trucks and carrier units.

700 HP Crewboat *Wildfire*

H.O.M.E. Boat Rental Service of Golden Meadows, La. has just taken delivery of a 54 ft. crew boat. The speedy craft, which attained 26 mph in her Lake Pontchartrain trials, bears the name *Wildfire*. The all steel craft, built by Equitable

Equipment Co., Inc., of New Orleans, is air conditioned throughout to afford the offshore rig operators the utmost in comfort while in transit. The *Wildfire* will work under contract to the California Co. out of Leeville, La. The speedy crew boat is outfitted to carry 40 persons and is built in accordance with American Bureau of Shipping and U.S. Coast Guard requirements for carrying passengers for hire. The dimensions of the *Wildfire* are: length overall 53 ft. 9 in.; beam overall 15 ft.; depth molded 7 ft.; draft molded 3 ft. 11 in. She is twin screw, powered by two General Motors turbo supercharged 6-110 diesel engines.

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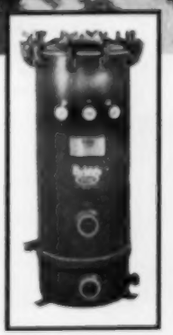

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ADVERTISERS' INDEX

Air-Maze Corporation, The 16

American Bosch Division of
American Bosch Arma Corp. 50-51

Bendix Aviation Corp.
Scintilla Division 1

Briggs Filtration Co., The 63

C. A. V. Ltd. 47

Cities Service Oil Co. 8

Clayton Manufacturing Company 17

Commercial Filters Corp. 54

Cooper-Bessemer Corp. ..... Fourth Cover

Dana Corporation 12

Electric Machinery Mfg. Co. 56

Emhart Manufacturing Co.
Maxim Division 59

Engineering Controls, Inc. 48

Enterprise Engine & Machinery Co. 7

Erie Forge & Steel Corporation 13

Fairbanks, Morse & Co. 5

Fulton Sylphon Division,
Robertshaw-Fulton Controls Co. 52

Garrett Corporation, The
(AiResearch Industrial Div.) 18

General Electric Company ..... Third Cover

General Motors Corp.
Harrison Radiator Division 2

Harrison Radiator Division,
General Motors Corp. 2

Hartford Machine Screw Company 56

Hilliard Corporation, The 60

Interstate Diesel Service, Inc. 63

Kato Engineering Company 58

Kittell Muffler & Engineering Co. 62

Koppers Company, Inc. 6

Lake Shore Electric Corp., The 58

Manzel Division,
Houdaille Industries, Inc. 62

Maxim Division,
Emhart Manufacturing Co. 59

M-C-M Machine Works Co. 63

Murray & Tregurtha, Inc. 61

Nordberg Manufacturing Co. 14

Perfect Circle Corporation 53

Purolator Products, Inc. 9

Quincy Compressor Co. 60

Robertshaw-Fulton Controls Co.
Fulton Sylphon Div. 52

Schwitzer Corporation 4

Scintilla Division,
Bendix Aviation Corp. 1

Standard Oil Co. of California 11

Texaco Inc. ..... Second Cover

Thomas Flexible Coupling Co. 64

Viking Pump Company 49

White Diesel Engine Div.,
The White Motor Company 10

Witte Engine Works, Oil Well Supply
Div. of United States Steel 49

Yates-American Machine Co. 55

Young Radiator Company 57

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